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WATER RESOURCES ACTIVITIES IN THE UNITED STATES. POPULATION PROJECTIONS AND ECONOMIC ASSUMPTIONS

Select Committee on National Water Resources, U. S. Senate

March 1960

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WATER RESOURCES ACTIVITIES IN THE UNITED STATES

POPULATION PROJECTIONS AND ECONOMIC ASSUMPTIONS

SELECT COMMITTEE ON NATIONAL WATER RESOURCES
UNITED STATES SENATE

PURSUANT TO

S. Res. 48

EIGHTY-SIXTH CONGRESS

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STATEMENT BY THE CHAIRMAN

JUNE 1, 1960.

To the Members of the Select Committee on National Water Resources:

As a basis for our studies of water requirements for the population, agriculture, and industry of the United States between the present time and 1980, under Senate Resolution 48, it was necessary that projections of population and economic growth be developed.

As the first step in developing these projections, I asked the Department of Commerce to have the Bureau of the Census prepare population projections for the United States, and each of the States for 1980 and 2000. In addition, projections were requested for sample regions and metropolitan areas, and a projection of the percentages of urban population to be expected in each State in those years. The Census Bureau's projections for the total population of the United States range from 232 to 274 million in 1980, and from 295 to 420 million in the year 2000.

As the studies for the committee got underway it was discovered that Resources for the Future, a privately endowed nonprofit research foundation, had plans for a water supply-demand study which would develop information similar to that needed by our committee. Accordingly, an agreement was consummated under which the committee staff and Resources for the Future would work together in assembling the data for the committee which was being furnished by the several Federal agencies. Resources for the Future had already developed economic assumptions and population projections for its studies of future resources needs. These were found to be adaptable for the committee's needs, and did not differ in any major respect from the preliminary figures which were being developed by the Bureau of the Census, and which were made available informally as the work progressed.

Of course, no one can predict accurately just what the rate of growth of the United States will be. Methods for projecting past trends have been developed by which projections can be made under various assumptions. The Resources for the Future population projections for the United States range from 225 million to 278 million in 1980, and from 267 million to 431 million in the year 2000. Along with these population projections Resources for the Future estimated that our gross national product, currently at about the $500 billion level, would reach to between $960 billion and $1,260 billion in 1980, and the Federal Reserve Board index of industrial production would increase from 134 in 1958, to between 303 and 437 in 1980. This index is based on levels prevailing in 1947–49 as equal to 100. Middle ranges of these projections were adopted as the basis for studies for the committee. For 1980, this contemplated a population of 244 million, gross national product of $1,060 billion, and an index of industrial production of 355. It is recognized, of course, that many factors not now determinable will affect these estimates.

Details on all of the projections are contained in this committee print. Part I is the staff report on the Resources for the Future population and economic projections; Part II consists of the report of the Census Bureau to the committee with its population projections; and Part III consists of an analysis of the differences between the two sets of projections, and a discussion of alternative ways of making projections for standard metropolitan areas, prepared by the staff of Resources for the Future.

It is believed that all this information will be of value to you, to other Members of the Senate, and to others who are interested in population projections as a basis for future planning in the field of water resources. Accordingly, I am having this report printed as one of our series of committee prints so that it will be generally available to workers in this field.

ROB'T S. KERR,
Chairman, Select Committee on National Water Resources.

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·WATER RESOURCE REGIONS·

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POPULATION PROJECTIONS AND ECONOMIC ASSUMPTIONS

PART I. STAFF REPORT

INTRODUCTION

The principal factors determining the future water needs of the United States are the Nation's population and industrial, including agricultural, production. As these increase, our withdrawal and use of water and our needs in fields related to our water resources, will increase. Thus, one of the basic needs for studies of the extent and character of water resources activities that will be needed for all purposes between the present time and 1980 are projections of population growth and of the rate of industrial production. Numerous estimates and projections are made of these factors for various purposes, all of which have the same basic weakness, to varying degrees, because of man's inability to predict what is going to happen in the future. Therefore, all assumptions as to future economic conditions and population must be recognized for what they are—projections of past and present trends into the future, with the most realistic allowances possible for future developments which may not even be comprehensible on the basis of our present knowledge.

At an early stage in the staff work for the Senate Select Committee on National Water Resources, it became evident that some of the objectives of the committee were similar to the objectives of a water supply-demand study which was about to be undertaken by Resources for the Future, a nonprofit research organization endowed by the Ford Foundation. After some discussions, an agreement between the committee and Resources for the Future was consummated under which the latter agreed to prepare a report on water supply-demand relationships in the United States.

Resources for the Future had been working for some time on projections of the Nation's future population and economic growth. As these were available, they were used as a starting point for the studies being undertaken for the committee by the Federal agencies which were to furnish basic data and projections for the water supply-demand study. In the meantime, the committee had requested the Bureau of the Census, U.S. Department of Commerce, to furnish it with population projections. Because of the amount of work involved, the pressure under which the Census Bureau was working in preparing for the 1960 census, and the committee's deadline, it was evident that the Census Bureau would not be able to furnish all of the figures needed for the committee's studies of every river basin in the United States, so Census was asked to provide data only for a sample, including some of the significant river basins and metropolitan areas. The staff of the Census Bureau was most cooperative, and an informal arrangement was worked out under which their projections of State, sample basin, and metropolitan area populations would be furnished to the committee as the individual parts were completed, so that they would be used as a basis for and as an independent check against certain parts of the Resources for the Future projections.

ECONOMIC ASSUMPTIONS

With respect to economic assumptions, it was agreed that all studies for the committee would be prepared on the assumption that there would be no wars or severe economic depressions, and that our economy would continue to grow roughly at the same rate as it has in the past. In order to avoid the necessity for predicting the exact rate of growth that may be expected to be achieved, a subject which has caused considerable controversy among politicians as well as economists, it was decided to use a range, incorporating high, medium, and low levels, for all projections.

The expert knowledge available in the Federal agencies that were preparing studies for the committee covering various aspects of water use as

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related to agriculture and industrial production was also called on, and each agency was asked to prepare its report to the committee on a basis incorporating high, medium, and low level assumptions that were not inconsistent with the Resources for the Future assumptions. Where lack of time precluded going through the details of computations on all three levels, the agencies were asked to prepare their reports on the medium level of assumptions with special attention being given to high levels if they appeared to induce some critical situation in regard to water supply and demand.

Resources for the Future's basic economic and population projections, under which the studies then proceeded, are shown in table I. The past and projected growth of the total U.S. population in the period 1900–2000 is shown graphically on figure I. It was understood that some modification of population figures might be needed after receipt of the Census Bureau's figures, but since the previously published Census projections, which are furnished under four different assumptions, appeared to be bracketed by Resources for the Future's high and low figures, it did not appear that any insoluble problems would be introduced by the fact that work on the studies for the committee would have to proceed concurrently with the working out of the details of the projections.

TABLE I.—Basic projections for studies

	1958 (actual)	1970	1980	1990	2000
Population [1] in millions:					
Low	(174.1)	201	225	248	267
Middle		207	244	286	329
High		222	278	347	431
Gross national product in billions of 1959 constant dollars:					
Low	(462.6)	709	960	.....	1,680
Middle		734	1,090	.....	2,200
High		810	1,260	.....	3,290
Federal Reserve Board index of industrial production (1947–49=100):					
Low	(134)	220	303	.....	573
Middle		239	355	.....	767
High		263	437	.....	1,180

[1] Contiguous United States, exclusive of Armed Forces overseas.

Because of the magnitude and complexity of many water resource projects, periods of from 10 to 20 years or more between authorization and completion, are not uncommon. It seems clear that many actions will have to be taken by 1980 and even earlier that should be influenced by what is expected to be needed in the year 2000. In addition, there is a need for projections to 2000 to help focus attention on the direction in which our uses will be trending in 1980. For these reasons, even though Senate Resolution 48 made reference only to the period between the present time and 1980, an attempt was made to have all data for the committee's studies projected to the year 2000.

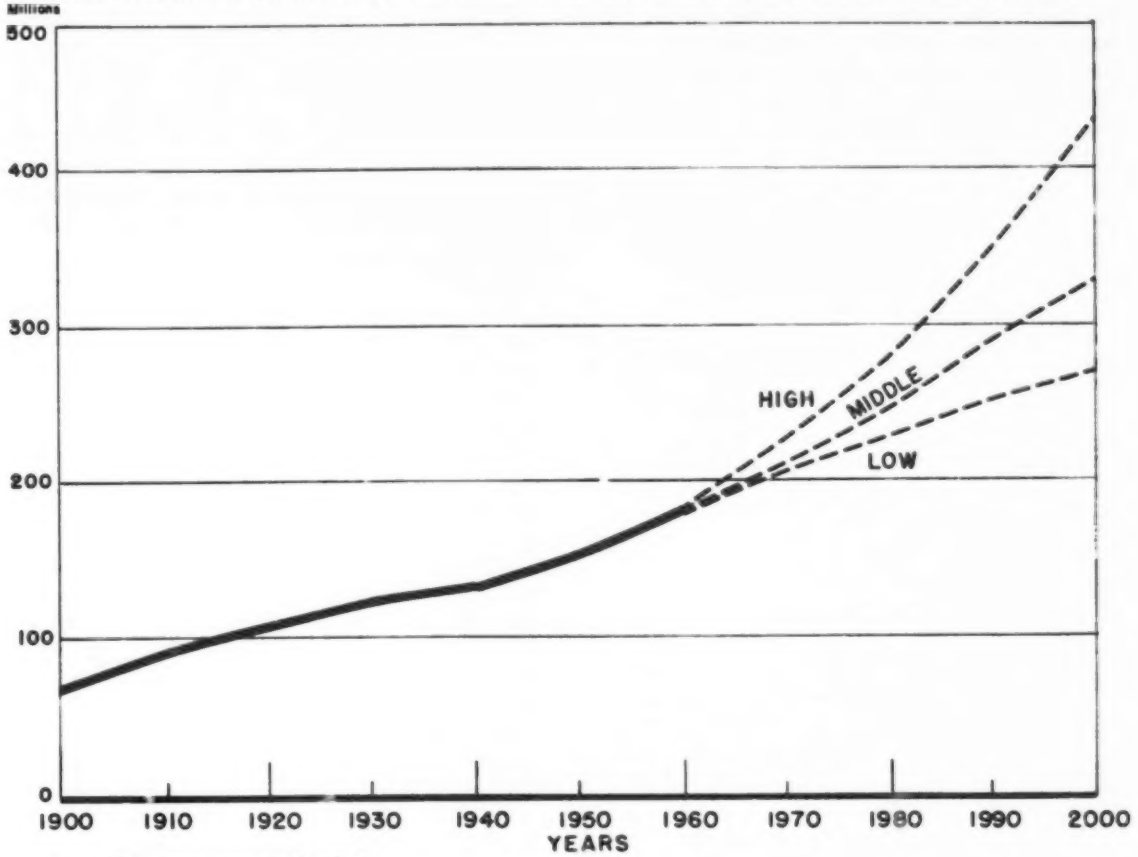
The further assumption was made to use 1959 price levels as a basis for future projections. Because of the availability of water use figures for 1954 from the census of manufactures and the census of mineral industries, that year was adopted as the year from which water uses were to be projected, although where later available figures were used, the agencies were requested to work them into the data.

WATER RESOURCE REGIONS

For the purpose of putting together the water supply-demand study in such a manner that questions asked in the committee reports on Senate Resolution 48 could be answered as to how much, when, and where water resources development was needed, it was necessary to break down the country into geographic areas for consideration. The water use regions of the 1954 census were adopted for this purpose, with some modifications, leading to a division of the country into a total of 22 water resource regions, plus Alaska and Hawaii, as shown on plate I. The boundaries of the regions follow the county lines which are closest to the physical boundary of the basins. This permits census data, which is collected and customarily analyzed by county and State, to be put together and analyzed by the water resource regions or, roughly, river basins or groups of contiguous river basins having similar geographical characteristics.

FIGURE I

TOTAL POPULATION OF CONTIGUOUS PORTION UNITED STATES OF AMERICA, PAST AND PROJECTED GROWTH, 1900–2000



From: U.S. census reports and table I.

In addition to the overall considerations of water supply and demand in each of the regions, it was decided to consider problems at a selected number of cities or metropolitan areas, at least one in each water resources region. In general the cities were selected to be representative of the type of problems which might be encountered, for example, in any river basin one metropolitan area might be on the main stem of the river, another might be a long way from a major river or tributary. The metropolitan areas selected, all but one of which are included in the U.S. Bureau of the Budget's list of Standard Metropolitan Statistical Areas, 1959, are as follows:

TABLE II.—*List of selected metropolitan areas*

New England:
- Boston.[1]
- Hartford.

Delaware and Hudson:
- New York-Northeastern New Jersey.[1]
- Philadelphia.[1]
- Albany-Schenectady-Troy.

Eastern Great Lakes and St. Louis: Detroit.
Chesapeake Bay:
- Washington.[1]
- Richmond.

Western Great Lakes:
- Chicago consolidated area.
- Lansing.

Ohio:
- Cincinnati.
- Indianapolis.

Cumberland: Nashville.
Tennessee: Chattanooga.
Southeast:
- Birmingham.
- Columbia, S.C.

Upper Mississippi:
- Cedar Rapids.
- St. Louis.

Lower Mississippi: New Orleans.
Upper Missouri:
- Denver.
- Sioux City.

Lower Missouri: Kansas City.[1]
Arkansas-White-Red, eastern: Little Rock.
Arkansas-Red, western:
- Oklahoma City.
- Amarillo.

Western Gulf:
- Houston.[1]
- Dallas.[1]
- Fort Worth.[1]
- San Antonio.

Rio Grande: Albuquerque.[1]
Colorado:
- Phoenix.[1]
- Grand Junction.

Pacific Northwest:
- Portland.
- Spokane.

Great Basin: Salt Lake City.
Central Pacific: San Francisco.[1]
South Pacific: Los Angeles.[1]

[1] Metropolitan areas for which projections were also made by the Bureau of the Census.

POPULATION PROJECTIONS

Projections of future population are usually made on the basis of statistical study of past population trends, taking into account births, deaths, marriages, fertility, migration, etc., and therefore cannot be more than an extension of past trends. There are no recognized ways of accurately predicting future population, and therefore all projections must be recognized for what they are, an extension of observed trends. As an example of the inexactness of the science of demography, one can point to the projections made 20 to 25 years ago. At that time, due no doubt to the economic recession and possibly to the aftereffects of World War I, generally accepted demographic methods led to forecasts of a decline in the rate of population increase for the United States even to the extent of projecting a leveling off in 1975 or 2000 at a total not much in excess of our 1960 population. Because the results of projecting past trends have frequently been underestimates of the actual rate of growth of the population and economy of the United States, many people conclude that such estimates are always on the low side. Only time can test the accuracy of any projection. This inability to forecast future trends has led demographers to make a series of projections, under differing assumptions, in an attempt to provide data for planning purposes that will provide a reasonable range. The Census Bureau used a series of four projections, ranging from series I, the highest, down through II, III, and IV, the lowest, for its latest projections.

Because projections of migration, which plays a larger part in population change for small than for large areas, are subject to greater error than are projections of births and deaths, demographic projections of small areas are more subject to error than are the projections of the total population of the entire country. The underlying reasons for migration between States and regions cannot be stated with precision, and this frequently lends to the inexactness of the results of population projections for small areas. In fact, it is likely that the decisions that are made as to water resources development can play an important part in determining the rate of migration to and from certain areas.

In an attempt to provide a suitable framework for the committee's studies in terms of population projections, Resources for the Future adapted its

high, medium, and low projections to the water resource regions and the selected standard metropolitan areas, using the techniques discussed in the following paragraphs, and on the basis of projections of population of the States furnished by the Census Bureau. Census estimates were supplied for 1970, 1980, and 2000 based upon national figures consistent with those published in Current Population Reports, Series P-25, No. 187. The national figures are presented in four series ranging from a series I, the highest, down to series IV, the lowest. The State projections were based on series II and IV only, because of the illustrative nature of the figures. The Census Bureau projections are shown in Part II of this report.

State populations

Since Resources for the Future national totals differed from both Census series II and series IV totals, an adjustment to Resources for the Future totals had to be made.[1] The Bureau of the Census estimated State populations on the basis of two different assumptions regarding migration. Assumption No. 1 was that—

> The average annual migration of the period 1950–58 is assumed to prevail to 1970 and then the average annual amount of migration of the 1940–58 period is assumed to prevail for the period 1970–80.

[1] Resources for the Future middle projections are equal to Census Series III. Resources for the Future high is somewhat in excess of series I and its low is somewhat below series IV by the year 2000.

Assumption No. 2 was that—

> Average annual amount of migration during the period 1958 to 1980 is assumed to equal one-half that of the 1940–58 period.

After 1980, for both assumptions—

> It was assumed that the change in the proportion of population in each State between 1980 and 2000 will be the same as the change in the proportion that occurred between 1970 and 1980, as implied by the projections for these dates.[2]

The Census estimates of State populations for each set of migration assumptions were converted to percentages of national total population. These percentages were then applied to Resources for the Future national totals. This yielded a population figure for each State corresponding to Resources for the Future's high, medium, and low national totals and for migration assumption No. 1 and migration assumption No. 2. These are shown in table III. Alaska and Hawaii are not included in the water supply-demand study, as their water resources and problems are not physically related to those of the contiguous States of the United States. Therefore, the following tables do not include population projections for the two newest States. The Bureau of Census projections for Alaska and Hawaii are included in Part II of this report.

[2] From report of Bureau of the Census to the Select Committee, Part II of this committee print, pp. 31-32.

TABLE III.—*Projected population by State, 1970, 1980, and 2000, and percentage of U.S. total*

State	Migration assumption No. 1											
	1970				1980				2000			
	Percentage distribution [1]	Low	Middle	High	Percentage distribution [1]	Low	Middle	High	Percentage distribution [1]	Low	Middle	High
United States	100.00	201,000,000	207,000,000	221,900,000	100.00	224,900,000	243,800,000	277,600,000	100.00	266,700,000	329,300,000	430,820,000
Alabama	1.64	3,296,400	3,394,800	3,639,200	1.52	3,418,500	3,705,800	4,219,500	1.40	3,733,800	4,610,200	6,031,200
Arizona	.86	1,728,600	1,780,200	1,908,200	.98	2,204,000	2,389,200	2,720,500	1.11	2,960,400	3,655,200	4,781,900
Arkansas	.72	1,447,200	1,490,400	1,597,700	.55	1,237,000	1,340,900	1,526,800	.42	1,120,100	1,383,100	1,809,400
California	9.71	19,517,100	20,099,700	21,546,500	10.74	24,154,300	26,184,100	29,814,200	11.84	31,577,300	38,989,100	51,006,700
Colorado	1.10	2,211,000	2,277,000	2,440,900	1.14	2,563,900	2,779,700	3,164,600	1.18	3,147,100	3,885,700	5,083,400
Connecticut	1.36	2,733,600	2,815,200	3,017,800	1.38	3,103,600	3,364,400	3,830,900	1.40	3,733,800	4,610,200	6,031,200
Delaware	.32	643,200	662,400	710,100	.35	787,200	853,300	971,600	.38	1,013,500	1,251,300	1,637,000
District of Columbia	.41	824,100	848,700	909,800	.39	877,100	950,800	1,082,600	.37	986,800	1,218,400	1,594,000
Florida	3.42	6,874,200	7,079,400	7,589,000	3.80	8,546,200	9,264,400	10,548,800	4.20	11,201,400	13,830,600	18,093,600
Georgia	2.09	4,200,900	4,326,300	4,637,700	2.01	4,520,500	4,900,400	5,579,800	1.91	5,094,000	6,289,600	8,288,300
Idaho	.37	743,700	765,900	821,000	.36	809,600	877,700	999,400	.35	933,500	1,152,600	1,507,800
Illinois	5.67	11,396,700	11,736,900	12,581,700	5.61	12,616,900	12,677,200	15,573,400	5.54	14,775,200	18,243,200	23,866,300
Indiana	2.69	5,406,900	5,568,300	5,969,100	2.73	6,139,800	6,655,700	7,578,500	2.75	7,334,300	9,055,800	11,847,000
Iowa	.49	2,954,900	3,084,300	3,306,300	1.39	3,126,100	3,388,800	3,858,600	1.30	3,467,100	4,280,900	5,600,400
Kansas	1.16	2,331,600	2,401,200	2,574,000	1.12	2,518,900	2,730,600	3,109,100	1.07	2,853,700	3,523,800	4,609,600
Kentucky	1.57	3,155,700	3,249,900	3,483,800	1.42	3,193,600	3,462,000	3,941,900	1.28	3,413,800	4,215,000	5,514,200
Louisiana	1.80	3,618,000	3,726,000	3,994,200	1.80	4,048,200	4,388,400	4,996,800	1.78	4,747,300	5,861,800	7,668,200
Maine	.49	984,900	1,014,300	1,087,300	.46	1,034,500	1,121,800	1,277,000	.43	1,146,800	1,416,000	1,852,400
Maryland	1.89	3,798,900	3,912,300	4,193,900	2.00	4,498,000	4,876,000	5,552,000	2.10	5,600,700	6,915,300	9,046,800
Massachusetts	2.48	4,984,800	5,133,600	5,503,100	2.35	5,285,200	5,729,300	6,523,600	2.23	5,947,400	7,343,400	9,606,800
Michigan	4.93	9,909,300	10,205,100	10,939,700	5.16	11,604,800	12,580,100	14,324,200	5.38	14,348,500	17,716,300	23,177,000
Minnesota	1.91	3,839,100	3,953,700	4,238,300	1.86	4,183,100	4,534,700	5,163,400	1.81	4,827,300	5,960,300	7,797,500
Mississippi	1.04	2,090,400	2,152,800	2,307,800	.90	2,024,100	2,194,200	2,498,400	.77	2,053,600	2,535,600	3,317,200
Missouri	2.27	4,562,700	4,698,900	5,037,100	2.14	4,812,900	5,217,300	5,940,600	2.01	5,360,700	6,618,900	8,659,100
Montana	.40	804,000	828,000	887,600	.39	877,100	950,800	1,082,600	.39	1,040,100	1,284,300	1,680,100
Nebraska	.79	1,587,900	1,635,300	1,753,000	.73	1,641,800	1,779,700	2,026,500	.68	1,813,600	2,239,200	2,929,400
Nevada	.21	422,100	434,700	466,000	.24	539,800	585,100	666,200	.27	720,100	889,100	1,163,200
New Hampshire	.32	643,200	662,400	710,100	.31	697,200	755,800	860,600	.29	773,400	955,000	1,249,300
New Jersey	3.46	6,954,600	7,162,200	7,677,700	3.52	7,916,500	8,581,800	9,771,500	3.57	9,521,200	11,756,000	15,379,600
New Mexico	.52	1,045,200	1,076,400	1,153,900	.56	1,259,400	1,365,300	1,554,600	.60	1,600,200	1,975,800	2,584,800
New York	8.85	17,788,500	18,319,500	19,638,200	8.59	19,318,900	20,942,400	23,845,800	8.31	22,162,800	27,364,800	35,799,500
North Carolina	2.51	5,045,100	5,195,700	5,569,700	2.41	5,420,100	5,875,600	6,690,200	2.31	6,160,800	7,606,800	9,951,500
North Dakota	.33	663,300	683,100	732,300	.29	652,200	707,000	805,000	.26	693,400	856,200	1,120,100
Ohio	5.57	11,195,700	11,529,900	12,359,800	5.68	12,774,300	13,847,800	15,767,000	5.77	15,388,600	19,000,600	24,857,200
Oklahoma	1.12	2,251,200	2,318,400	2,485,300	.97	2,181,500	2,364,900	2,692,700	.82	2,186,900	2,700,300	3,532,600
Oregon	1.02	2,050,200	2,111,400	2,263,400	1.07	2,406,400	2,608,700	2,970,300	1.12	2,987,000	3,688,200	4,825,000
Pennsylvania	5.81	11,678,100	12,026,700	12,892,400	5.48	12,324,500	13,360,200	15,212,500	5.16	13,761,700	16,991,900	22,229,300
Rhode Island	.47	944,700	972,900	1,042,900	.45	1,012,100	1,097,100	1,249,200	.43	1,146,800	1,416,000	1,852,400
South Carolina	1.33	2,673,300	2,753,100	2,951,300	1.28	2,878,700	3,120,600	3,553,300	1.22	3,253,700	4,017,500	5,255,800
South Dakota	.37	743,700	765,900	821,000	.34	764,700	828,900	943,800	.31	826,800	1,020,800	1,335,500
Tennessee	1.79	3,597,900	3,705,300	3,927,000	1.69	3,800,800	4,120,200	4,691,400	1.59	4,240,500	5,235,900	6,849,700
Texas	5.71	11,477,100	11,819,700	12,670,500	5.85	13,156,700	14,262,300	16,239,600	5.95	15,868,700	19,595,400	25,632,600
Utah	.55	1,105,500	1,138,500	1,220,500	.58	1,304,400	1,414,000	1,610,100	.61	1,626,900	2,008,700	2,627,900
Vermont	.17	341,700	351,900	377,200	.16	359,800	390,100	444.200	.15	400,100	494,000	646,200
Virginia	2.32	4,663,200	4,802,400	5,148,100	2.35	5,285,200	5,729,300	6,523,600	2.36	6,294,100	7,771,500	10,166,900
Washington	1.63	3,276,300	3,374,100	3,617,000	1.71	3,845,800	4,169,000	4,747,000	1.79	4,773,900	5,894,500	7,711,300
West Virginia	.91	1,829,100	1,883,700	2,019,300	.79	1,776,700	1,926,000	2,193,000	.68	1,813,600	2,239,200	2,929,400
Wisconsin	2.26	4,542,600	4,678,200	5,014,900	2.23	5,015,300	5,436,700	6,190,500	2.19	5,840,700	7,211,700	9,434,500
Wyoming	.17	341,700	351,900	377,200	.17	382,300	414,500	471,900	.17	453,400	559,800	732,400

TABLE III.—*Projected population by State, 1970, 1980, and 2000, and percentage of U.S. total*—Continued

	Migration assumption No. 2											
	1970				1980				2000			
	Percentage distribution [1]	Low	Middle	High	Percentage distribution [1]	Low	Middle	High	Percentage distribution [1]	Low	Middle	High
United States	100.00	201,000,000	207,000,000	221,900,000	100.00	224,900,000	243,800,000	277,600,000	100.00	266,700,000	329,300,000	430,800,000
Alabama	1.79	3,597,900	3,705,300	3,972,000	1.75	3,935,800	4,266,500	4,858,000	1.71	4,560,600	5,631,000	7,366,700
Arizona	.77	1,547,700	1,593,900	1,708,600	.86	1,934,100	2,096,700	2,387,400	.95	2,533,700	3,128,400	4,092,600
Arkansas	.92	1,849,200	1,904,400	2,041,500	.85	1,911,700	2,072,300	2,359,600	.79	2,106,900	2,601,500	3,403,300
California	9.20	18,492,000	19,044,000	20,414,800	9.81	22,062,700	23,916,800	27,232,600	10.45	27,870,200	34,411,900	45,018,600
Colorado	1.02	2,050,200	2,111,400	2,263,400	1.05	2,361,500	2,559,900	2,914,800	1.07	2,853,700	3,523,500	4,609,600
Connecticut	1.34	2,693,400	2,773,800	2,973,500	1.35	3,036,200	3,921,300	3,747,600	1.35	3,600,500	4,445,600	5,815,800
Delaware	.29	582,900	600,300	643,500	.30	674,700	731,400	832,800	.32	853,400	1,053,800	1,378,600
District of Columbia	.46	924,600	952,200	1,020,700	.45	1,012,100	1,097,100	1,249,200	.43	1,146,800	1,416,000	1,852,400
Florida	2.91	5,849,100	6,023,700	6,457,300	3.14	7,061,900	7,655,300	8,716,600	3.38	9,014,500	11,130,300	14,561,000
Georgia	2.19	4,401,900	4,533,300	4,859,600	2.17	4,880,300	5,290,500	6,023,900	2.15	5,734,100	7,080,000	9,262,200
Idaho	.38	763,800	786,600	843,200	.38	854,600	926,400	1,054,900	.38	1,013,500	1,251,300	1,637,000
Illinois	5.58	11,215,800	11,550,600	12,382,000	5.51	12,392,000	13,433,400	15,295,800	5.42	14,455,100	17,848,100	23,349,400
Indiana	2.66	5,346,600	5,506,200	5,902,500	2.67	6,004,800	6,509,500	7,411,900	2.68	7,147,600	8,825,200	11,545,400
Iowa	1.53	3,075,300	3,167,100	3,395,100	1.46	3,283,500	3,559,500	4,053,000	1.40	3,733,000	4,610,200	6,031,200
Kansas	1.18	2,371,800	2,442,600	2,618,400	1.16	2,608,800	2,828,100	3,220,200	1.13	3,013,700	3,721,100	4,868,000
Kentucky	1.68	3,376,800	3,477,600	3,727,900	1.61	3,620,900	3,925,200	4,469,400	1.54	4,107,200	5,071,200	6,634,300
Louisiana	1.84	3,698,400	3,808,800	4,083,000	1.87	4,205,600	4,559,100	5,191,100	1.89	5,040,600	6,223,800	8,142,100
Maine	.52	1,045,200	1,076,400	1,153,900	.50	1,124,500	1,219,000	1,388,000	.49	1,306,800	1,613,600	2,110,900
Maryland	1.81	3,638,100	3,746,700	4,016,400	1.87	4,205,600	4,559,100	5,191,100	1.94	5,174,000	6,388,400	8,357,500
Massachusetts	2.65	5,326,500	5,485,500	5,880,400	2.54	5,712,500	6,192,500	7,051,000	2.44	6,507,500	8,034,900	10,511,500
Michigan	4.77	9,587,700	9,873,900	10,584,600	4.92	11,065,100	11,995,000	13,657,900	5.07	13,521,700	16,695,500	21,841,600
Minnesota	1.91	3,839,100	3,953,700	4,238,300	1.88	4,228,100	4,583,400	5,218,900	1.85	4,934,000	6,092,100	7,969,800
Mississippi	1.20	2,412,000	2,484,000	2,662,800	1.15	2,586,400	2,803,700	3,192,400	1.11	2,960,400	3,655,200	4,781,900
Missouri	2.31	4,643,100	4,781,700	5,125,900	2.21	4,970,300	5,388,000	6,135,000	2.12	5,654,000	6,981,200	9,133,000
Montana	.39	783,900	807,300	865,400	.39	877,100	950,800	1,082,600	.39	1,040,100	1,284,300	1,680,100
Nebraska	.79	1,587,900	1,635,300	1,755,000	.76	1,709,200	1,852,900	2,109,800	.73	1,946,900	2,403,900	3,144,800
Nevada	.18	361,800	372,600	399,400	.20	449,800	487,600	555,200	.21	560,100	691,500	904,700
New Hampshire	.32	643,200	662,400	710,100	.31	697,200	755,800	860,600	.30	800,100	987,900	1,292,400
New Jersey	3.32	6,673,200	6,872,400	7,367,100	3.33	7,489,200	8,118,500	9,244,100	3.33	8,881,100	10,965,700	14,345,600
New Mexico	.54	1,085,400	1,117,800	1,198,300	.58	1,304,400	1,414,000	1,610,100	.62	1,653,500	2,041,700	2,671,000
New York	8.92	17,929,200	18,464,400	19,793,500	8.62	19,386,400	21,015,600	23,929,100	8.33	22,216,100	27,430,700	35,885,600
North Carolina	2.60	5,226,000	5,382,000	5,769,400	2.56	5,757,400	6,241,300	7,106,600	2.53	6,747,500	8,331,300	10,899,200
North Dakota	.35	703,500	724,500	776,700	.34	764,700	828,900	943,800	.33	880,100	1,086,700	1,421,600
Ohio	5.47	10,997,000	11,322,900	12,137,900	5.52	12,414,500	13,457,800	15,323,500	5.57	14,855,200	18,342,000	23,995,600
Oklahoma	1.20	2,412,000	2,484,000	2,662,800	1.12	2,518,900	2,730,600	3,109,100	1.05	2,800,400	3,457,700	4,523,400
Oregon	1.06	2,130,600	2,194,200	2,352,100	1.07	2,406,400	2,608,700	2,970,300	1.09	2,907,000	3,589,400	4,695,700
Pennsylvania	6.02	12,100,200	12,461,400	13,358,400	5.78	12,999,200	14,091,600	16,045,300	5.53	14,748,500	18,210,300	23,823,200
Rhode Island	.48	964,800	993,600	1,065,100	.46	1,034,500	1,121,500	1,277,000	.44	1,173,500	1,448,900	1,895,500
South Carolina	1.39	2,793,900	2,877,300	3,084,400	1.38	3,103,600	3,364,400	3,830,900	1.38	3,680,500	4,544,300	5,945,000
South Dakota	.39	783,900	807,300	865,400	.38	854,600	926,400	1,054,900	.36	960,100	1,185,500	1,550,900
Tennessee	1.93	3,879,300	3,995,100	4,282,700	1.87	4,205,600	4,559,100	5,191,100	1.82	4,853,900	5,993,300	7,840,600
Texas	5.60	11,256,000	11,592,000	12,426,400	5.72	12,864,300	13,945,400	15,878,200	5.83	15,548,600	19,198,200	25,115,600
Utah	.54	1,085,400	1,117,800	1,198,300	.57	1,281,900	1,389,700	1,582,300	.59	1,573,500	1,942,900	2,541,700
Vermont	.20	402,000	414,000	443,800	.19	427,300	463,200	527,400	.19	506,700	625,700	818,500
Virginia	2.30	4,623,000	4,761,000	5,103,700	2.32	5,217,700	5,656,200	6,440,300	2.33	6,214,100	7,676,700	10,037,600
Washington	1.66	3,336,600	3,436,200	3,683,500	1.70	3,823,300	4,144,600	4,719,200	1.74	4,640,600	5,729,800	7,495,900
West Virginia	1.05	2,110,500	2,173,500	2,330,000	.98	2,204,000	2,389,200	2,720,500	.92	2,453,600	3,029,600	3,963,400
Wisconsin	2.23	4,482,300	4,616,100	4,948,400	2.20	4,947,800	5,363,600	6,107,200	2.16	5,760,700	7,112,900	9,305,300
Wyoming	.18	361,800	372,600	339,400	.18	404,800	438,800	499,700	.18	480,100	592,700	775,400

[1] Percentage distribution computed from materials prepared by Bureau of the Census for Select Committee on National Water Resources. (See part II, p. 23ff.) Percentages were applied to U.S. totals as estimated by Resources for the Future.

Projection of total population in each water resource region

The population of each State was distributed among the water resource regions in which the State was located. This was done for each of the Census years 1930, 1940, and 1950 (table IV).

TABLE IV.—*State population divided among water resource regions, 1930, 1940, 1950, 1970, 1980, and 2000*

[Percent]

State and water resource region	1930	1940	1950	1970	1980	2000
Alabama:						
Southeast	85.36	85.42	85.72	86.11	86.19	86.36
Tennessee	14.64	14.58	14.28	13.89	13.81	13.64
Arizona: Colorado	100.00	100.00	100.00	100.00	100.00	100.00
Arkansas:						
Lower Mississippi	19.11	20.37	20.90	21.91	22.38	23.39
Lower Arkansas-White-Red	80.89	79.63	79.10	78.09	77.62	76.61
California:						
Colorado	1.07	.86	.59	.36	.31	.22
Great Basin	.14	.15	.15	.11	.11	.10
Central Pacific	48.20	46.69	46.48	45.77	45.30	44.36
South Pacific	50.59	52.30	52.80	53.76	54.28	55.32
Colorado:						
Upper Missouri	56.25	56.77	61.23	66.83	68.22	69.89
Upper Arkansas-Red	27.71	25.25	23.52	20.48	19.25	18.08
Upper Rio Grande and Pecos	4.00	4.41	3.49	2.65	2.56	2.34
Colorado	12.03	13.57	11.76	10.04	9.97	9.68
Connecticut: New England	100.00	100.00	100.00	100.00	100.00	100.00
Delaware: Delaware and Hudson	100.00	100.00	100.00	100.00	100.00	100.00
District of Columbia: Chesapeake Bay	100.00	100.00	100.00	100.00	100.00	100.00
Florida: Southeast	100.00	100.00	100.00	100.00	100.00	100.00
Georgia:						
Southeast	97.82	97.55	97.44	97.21	97.09	96.86
Tennessee	2.18	2.45	2.56	2.79	2.91	3.14
Idaho:						
Great Basin	5.20	4.49	3.58	2.67	2.39	1.94
Pacific Northwest	94.80	95.51	96.42	97.38	97.61	98.06
Illinois:						
Western Great Lakes	57.85	57.39	58.85	60.52	60.76	61.24
Ohio River	7.08	7.18	6.68	6.12	6.03	5.85
Upper Mississippi	35.07	35.42	34.47	33.36	33.21	32.90
Indiana:						
Eastern Great Lakes	6.33	6.27	6.32	6.38	6.37	6.35
Western Great Lakes	18.83	19.15	20.72	22.92	23.45	24.52
Ohio River	73.02	72.74	71.10	68.85	69.39	67.26
Upper Mississippi	1.82	1.85	1.85	1.86	1.86	1.87
Iowa:						
Upper Mississippi	74.37	75.49	77.18	79.41	80.02	81.25
Upper Missouri	2.68	2.60	2.45	2.26	2.21	2.10
Lower Missouri	22.95	21.91	20.36	18.33	17.77	16.65
Kansas:						
Upper Missouri	44.87	45.27	45.72	45.81	45.80	45.78
Lower Missouri	5.85	5.56	4.82	3.95	3.75	3.35
Upper Arkansas-Red	31.45	31.89	34.81	38.52	39.32	40.93
Lower Arkansas-Red	17.82	17.28	14.65	11.73	11.13	9.93
Kentucky:						
Ohio River	81.73	81.11	82.41	83.77	83.92	84.83
Cumberland	14.73	15.39	14.44	13.47	13.40	13.25
Tennessee	1.17	1.25	1.14	1.04	1.03	1.01
Lower Mississippi	2.36	2.25	2.00	1.72	1.65	1.51
Louisiana:						
Southeast	4.62	4.38	4.42	4.39	4.34	4.23
Lower Mississippi	52.51	52.82	55.27	58.37	59.00	60.33
Lower Arkansas-White-Red	29.97	29.71	27.69	25.19	24.69	23.64
Western Gulf	12.91	13.09	12.62	12.05	11.97	11.80
Maine: New England	100.00	100.00	100.00	100.00	100.00	100.00
Maryland:						
Chesapeake Bay	98.78	98.79	99.09	99.36	99.40	99.49
Ohio River	1.22	1.21	.91	.64	.60	.51
Massachusetts: New England	100.00	100.00	100.00	100.00	100.00	100.00
Michigan:						
Eastern Great Lakes	48.43	48.89	51.65	55.19	55.99	57.58
Western Great Lakes	51.57	51.11	48.35	44.81	44.01	42.42
Minnesota:						
Western Great Lakes	9.18	8.63	8.09	7.34	7.11	6.64
Upper Mississippi	79.16	79.41	81.07	83.03	83.44	84.27
Upper Missouri	11.16	11.98	10.84	9.63	9.45	9.08
Mississippi:						
Southeast	48.87	50.09	53.43	57.83	58.55	61.18
Tennessee	.82	.78	.71	.63	.60	.55
Lower Mississippi	50.32	49.13	45.86	41.54	40.45	38.27
Missouri:						
Upper Mississippi	39.80	40.13	42.62	46.02	46.89	47.97
Lower Mississippi	5.93	6.97	6.59	6.37	6.52	6.85
Lower Missouri	42.59	40.61	39.24	36.87	35.92	34.57
Lower Arkansas-White-Red	11.69	12.29	11.55	10.75	10.68	10.61
Montana:						
Upper Missouri	71.29	69.06	68.59	67.16	66.24	64.39
Pacific Northwest	28.71	30.94	31.43	32.84	33.76	35.60
Nebraska: Upper Missouri	100.00	100.00	100.00	100.00	100.00	100.00
Nevada:						
Colorado [1]	13.32	18.63	32.86	47.21	50.31	56.52
Great Basin	86.68	81.37	67.44	52.79	49.69	43.48
New Hampshire: New England	100.00	100.00	100.00	100.00	100.00	100.00
New Jersey: Delaware and Hudson	100.00	100.00	100.00	100.00	100.00	100.00
New Mexico:						
Upper Arkansas-Red	13.17	10.39	7.32	44.49	3.89	2.68
Upper Rio Grande and Pecos	76.52	80.12	84.70	89.33	90.38	92.47
Colorado	10.31	9.49	7.98	6.18	5.73	4.84
New York:						
Delaware and Hudson	75.01	75.89	75.94	78.45	78.59	75.90
Chesapeake Bay	3.52	3.47	3.51	3.55	3.55	3.54
Eastern Great Lakes	21.47	20.64	20.89	21.00	20.86	20.57
North Carolina:						
Southeast	89.49	89.38	90.19	91.09	91.25	91.56
Ohio River	1.37	1.38	1.19	1.00	.96	.89
Tennessee	9.15	9.24	8.62	7.91	7.79	7.55
North Dakota: Upper Missouri	100.00	100.00	100.00	100.00	100.00	100.00
Ohio:						
Eastern Great Lakes	42.36	41.43	41.86	42.17	42.04	41.80
Ohio River	57.64	58.57	58.14	57.83	57.96	58.22
Oklahoma:						
Upper Arkansas-Red	72.07	68.88	68.51	67.19	66.25	64.32
Lower Arkansas-White-Red	27.93	31.12	31.49	32.81	33.75	35.67
Oregon:						
Great Basin	1.13	1.07	.84	.62	.58	.49
Pacific Northwest	95.47	95.21	96.39	97.41	97.55	97.84
Central Pacific	3.40	3.72	2.77	1.97	1.87	1.67

[1] Because of the great increase in the Colorado water resource region of Nevada, this figure has been computed as being the difference between the total and the Great Basin figure.

TABLE IV.—*State population divided among water resource regions, 1930, 1940, 1950, 1970, 1980, and 2000*—Con.

[Percent]

State and water resource region	1930	1940	1950	1970	1980	2000
Pennsylvania:						
Delaware and Hudson	37.90	37.58	39.16	41.01	41.31	41.88
Chesapeake Bay	25.66	28.85	24.63	23.19	22.94	22.44
Eastern Great Lakes	1.82	1.83	2.09	2.48	2.58	2.73
Ohio River	34.55	34.76	34.13	33.32	33.20	32.95
Rhode Island: New England	100.00	100.00	100.00	100.00	100.00	100.00
South Carolina: Southeast	100.00	100.00	100.00	100.00	100.00	100.00
South Dakota:						
Upper Mississippi	3.83	4.11	3.85	3.61	3.61	3.62
Upper Missouri	96.17	95.89	96.15	96.39	96.39	96.38
Tennessee:						
Cumberland	24.04	23.84	23.17	22.30	22.10	21.68
Tennessee	48.96	49.66	49.51	49.47	49.59	49.86
Lower Mississippi	27.00	26.50	27.32	28.23	28.31	28.46
Texas:						
Upper Arkansas-Red	8.56	7.41	6.39	6.23	5.91	5.26
Lower Arkansas-White-Red	5.48	5.20	3.76	2.48	2.26	1.82
Western Gulf	82.30	83.78	84.86	85.73	86.03	86.65
Upper Rio Grande and Pecos	3.66	3.60	4.39	5.56	5.80	6.28
Utah:						
Colorado	12.65	12.94	10.99	8.99	8.67	8.04
Great Basin	87.35	87.06	89.01	91.01	91.33	91.96
Vermont:						
New England	37.85	37.82	37.35	36.76	36.64	36.39
Eastern Great Lakes	62.15	62.18	62.65	63.24	63.36	63.61
Virginia:						
Chesapeake Bay	61.59	61.40	66.24	71.72	72.69	74.65
Southeast	21.70	21.00	18.33	15.17	14.49	13.13
Ohio River	7.13	7.75	7.05	6.30	6.26	6.16
Tennessee	9.58	9.85	8.38	6.81	6.56	6.06
Washington: Pacific Northwest	100.00	100.00	100.00	100.00	100.00	100.00
West Virginia:						
Chesapeake Bay	6.48	6.32	5.93	5.44	5.32	5.09
Ohio River	93.52	93.68	94.07	94.56	94.68	94.91
Wisconsin:						
Western Great Lakes	57.76	57.48	58.65	60.03	60.25	60.69
Upper Mississippi	42.24	42.52	41.35	39.97	39.75	39.31
Wyoming:						
Upper Missouri	82.45	83.16	85.05	87.15	87.58	88.47
Colorado	8.91	8.85	8.43	7.87	7.75	7.80
Great Basin	7.74	6.98	5.63	4.21	3.90	3.27
Pacific Northwest	.89	1.01	.89	.77	.77	.77

Then an extrapolation for 1960 was made in accordance with the relationship

$$a\frac{a}{b}=c$$

where:

a=1950 percent of State population in water resource region R,

b=1940 percent of State population in water resource region R,

c=1960 percent of State population in water resource region R.

The extrapolation for 2000 was made in accordance with the relationship

$$c\frac{a}{d}=e$$

where:

d=1930 percent of State population in water resource region R,

e=2000 percent of State population in water resource region R.

The percent for 1980 was computed by a straight-line interpolation between the percents, as computed for 1960 and 2000.

Where the addition of the extrapolated percentages for all of the regions into which a State was divided yielded a total in excess of 100 percent, the components were proportionately reduced so that the total was equal to 100 percent. A comparable adjustment was made if the sum of the components fell short of 100 percent.

The resulting percentage distributions of each State's population among the water resource regions into which the State was divided, as shown in table IV, were then applied to the projections of State populations derived from the Bureau of the Census estimates.

By aggregation, regional totals were computed for Resources for the Future high, middle, and low national totals and for migration assumptions No. 1 and No. 2. These are shown in table V. The projected population for the year 2000 (middle range) and the percentage increase in the period 1950–2000, by regions, are graphically depicted in figures II and III.

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TABLE V.—*Projections of total population by water resource region*

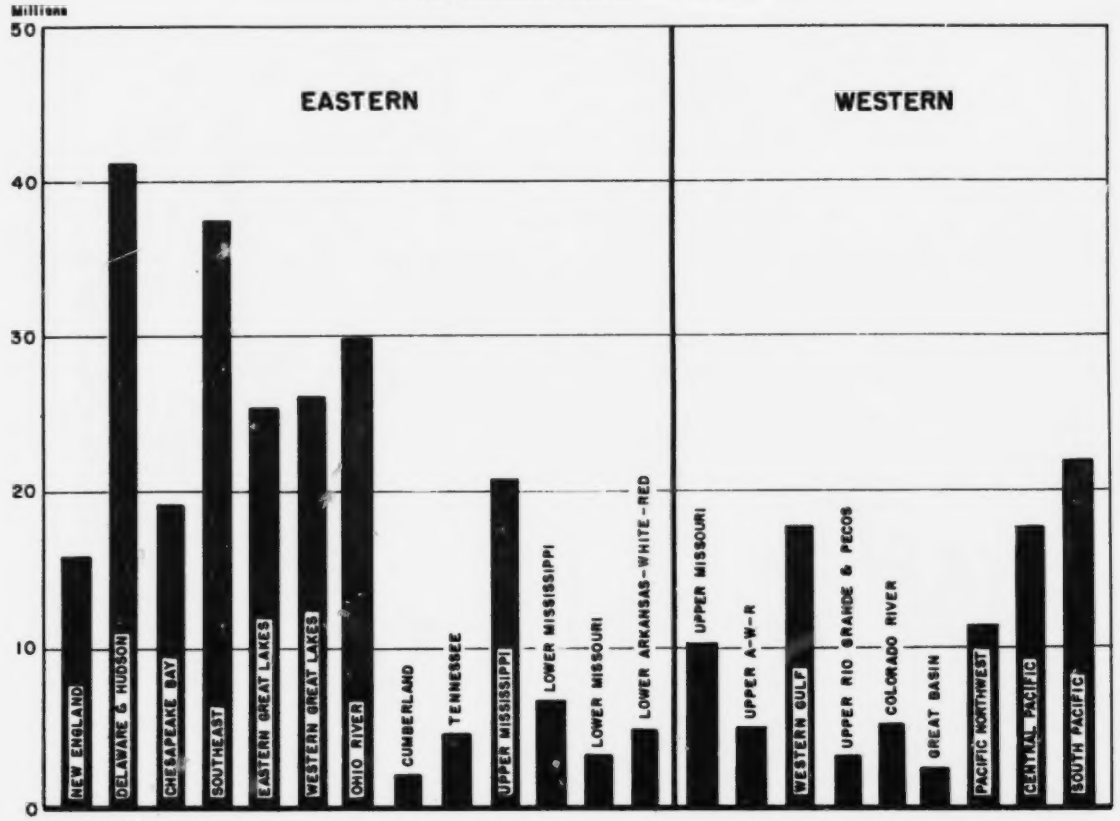
[In millions]

Water resource region	Breakdown of U.S. census figures				Migration assumption No. 1									Migration assumption No. 2								
					Low			Middle			High			Low			Middle			High		
	1920	1930	1940	1950	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
New England	7.2	7.9	8.2	9.1	10.4	11.3	12.8	10.7	12.2	15.8	11.5	13.9	20.7	10.8	11.8	13.6	11.1	12.8	16.8	11.9	14.5	21.9
Delaware and Hudson	14.2	17.4	18.4	20.5	25.9	28.5	33.2	26.7	30.9	41.0	28.6	35.2	53.7	25.7	28.2	32.8	26.5	30.6	40.5	28.4	34.8	52.9
Chesapeake Bay	6.1	6.6	7.3	8.5	11.4	12.8	15.3	11.7	13.9	18.9	12.6	15.8	24.7	11.4	12.8	15.2	11.8	13.8	18.7	12.6	15.8	24.5
Southeast	11.2	12.8	14.2	16.4	23.1	25.7	30.3	23.7	27.9	37.4	25.5	31.7	49.0	23.0	26.0	31.2	23.7	28.2	38.5	25.4	32.1	50.4
Eastern Great Lakes	6.7	8.5	8.8	10.4	14.8	16.9	20.4	15.2	18.3	25.2	16.3	20.8	33.0	14.6	16.4	19.7	15.0	17.8	24.4	16.1	20.3	31.9
Western Great Lakes	7.7	9.5	9.9	11.3	15.6	17.6	20.9	16.1	19.0	25.7	17.2	21.7	33.7	15.3	17.1	20.2	15.7	18.5	24.9	16.9	21.1	32.6
Ohio River	12.8	14.1	14.9	16.2	19.5	21.1	24.2	20.1	22.9	29.9	21.5	26.1	39.1	19.9	21.9	25.4	20.5	23.7	31.4	22.0	27.0	41.1
Cumberland	.9	1.0	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.7	1.3	1.5	2.2	1.3	1.4	1.6	1.4	1.5	2.0	1.5	1.7	2.6
Tennessee	2.0	2.3	2.6	2.8	3.1	3.3	3.6	3.2	3.5	4.5	3.4	4.0	5.8	3.3	3.6	4.2	3.4	3.9	5.1	3.7	4.5	6.7
Upper Mississippi	8.8	9.3	9.9	10.6	13.4	14.6	16.7	13.8	15.8	21.6	14.8	18.0	27.0	13.4	14.7	17.1	13.8	15.9	21.1	14.8	18.2	27.6
Lower Mississippi	3.1	3.5	3.8	4.1	4.6	4.8	5.4	4.7	5.2	6.7	5.1	6.0	8.7	5.0	5.5	6.5	5.2	6.0	8.0	5.5	6.8	10.5
Upper Missouri	4.8	5.1	5.0	5.3	6.8	7.3	8.3	7.0	7.9	10.2	7.5	9.0	13.5	6.8	7.5	8.7	7.0	8.1	10.8	7.5	9.3	14.1
Lower Missouri	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.4	2.6	3.1	2.6	2.9	4.0	2.4	2.5	2.7	2.4	2.7	3.3	2.6	3.0	4.3
Upper Arkansas-White-Red	2.6	3.2	3.0	3.1	3.6	3.7	4.0	3.7	4.0	4.9	4.0	4.6	6.4	3.7	4.0	4.4	3.8	4.3	5.4	4.1	4.8	7.1
Lower Arkansas-White-Red	3.7	3.9	4.1	4.0	3.8	3.7	3.8	3.9	4.0	4.7	4.2	4.6	6.1	4.2	4.5	5.1	4.3	4.9	6.2	4.7	5.5	8.1
Western Gulf	4.0	5.1	5.7	6.9	10.3	11.8	14.3	10.6	12.8	17.6	11.3	14.6	23.1	10.1	11.6	14.1	10.4	12.5	17.4	11.1	14.3	22.7
Upper Rio Grande and Pecos	.4	.6	.7	1.0	1.6	1.9	2.5	1.7	2.1	3.1	1.8	2.4	4.1	1.6	2.0	2.6	1.7	2.2	3.2	1.8	2.5	4.2
Colorado	.6	.8	.9	1.2	2.4	3.0	4.0	2.5	3.3	5.0	2.7	3.8	6.5	2.2	2.7	3.4	2.3	2.9	4.2	2.4	3.3	5.5
Great Basin	.5	.6	.6	.8	1.3	1.5	1.9	1.3	1.7	2.3	1.4	1.9	3.1	1.2	1.5	1.8	1.3	1.6	2.2	1.4	1.8	2.9
Pacific Northwest	2.7	3.1	3.5	4.6	6.3	7.3	9.1	6.5	8.0	11.3	6.9	9.1	14.7	6.4	7.3	8.9	6.6	7.9	10.9	7.1	9.0	14.3
Central Pacific	2.1	2.8	3.3	5.0	9.0	11.1	14.4	9.3	12.1	17.7	10.0	13.7	23.2	8.5	10.0	12.4	8.8	10.9	15.3	9.4	12.4	20.0
South Pacific	1.3	2.9	3.6	5.6	10.5	13.3	17.9	10.9	14.4	22.0	11.6	16.4	28.8	9.9	12.0	15.4	10.2	13.0	19.0	11.0	14.8	24.9
United States,[1] total	105.7	122.8	131.7	150.7	201.0	225.0	267.0	207.0	244.0	329.0	222.0	278.0	431.0	201.0	225.0	267.0	207.0	244.0	329.0	222.0	278.0	431.0

[1] Contiguous United States.

FIGURE II

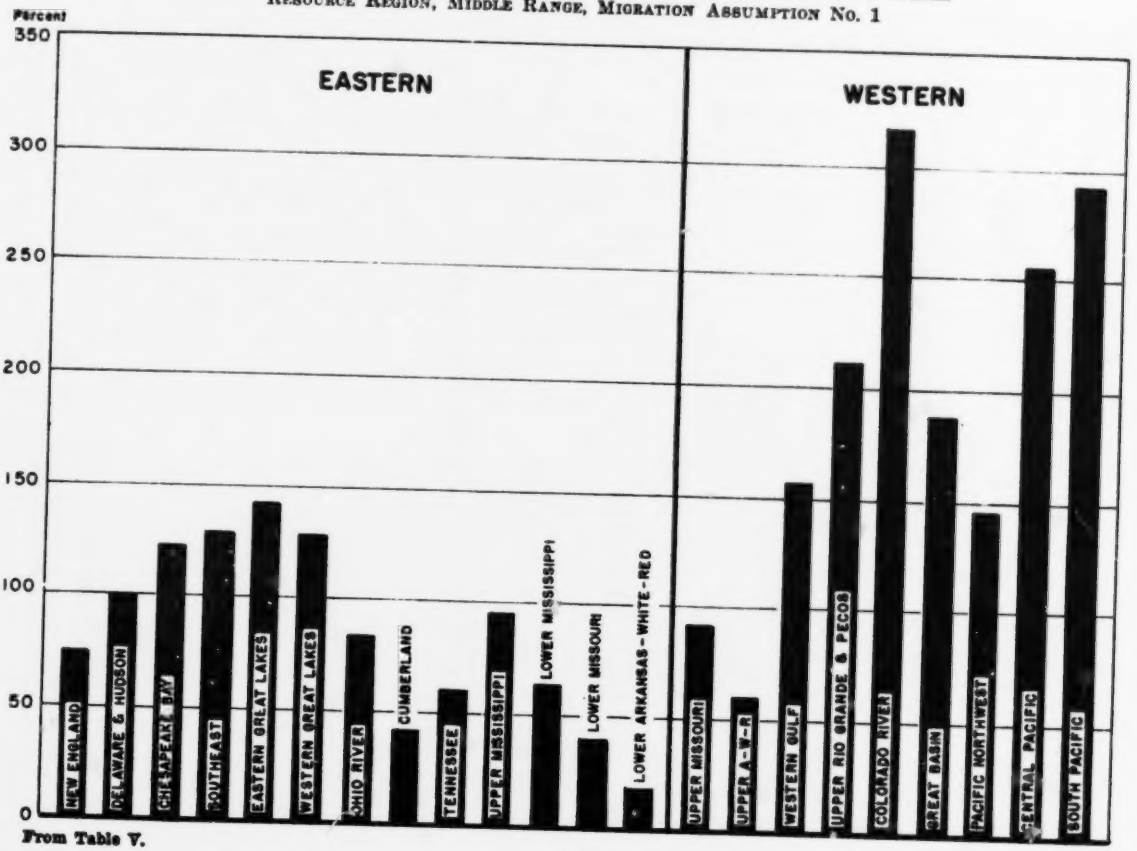
PROJECTED TOTAL POPULATION, BY WATER RESOURCE REGION, YEAR 2000, MIDDLE RANGE, MIGRATION ASSUMPTION NO. 1



From Table V.

FIGURE III

PERCENTAGE INCREASE 1950–2000 IN PROJECTED TOTAL POPULATION, BY WATER RESOURCE REGION, MIDDLE RANGE, MIGRATION ASSUMPTION NO. 1



From Table V.

Projection of urban population by water resource region

For each water resource region the ratio of urban population to total population for 1950 was computed. The same ratio was computed for the total population of "representative States" located within the region. The representative States included all of the States for which a significantly large part was located within the region and for which the urban-rural division would be expected to conform roughly to what would be expected in the water resource region. A single State might be used as "representative State" for more than one region. For example, Ohio, along with Michigan and Vermont, served as a representative State for the Eastern Great Lakes region. (New York was excluded because of the domination by New York City in the statewide rural-urban division.) Ohio, along with Indiana, Kentucky, West Virginia, and Pennsylvania, was also a representative State for the Ohio Basin.

A ratio of the two percentages was then computed:

$$\frac{a}{b}$$

where

a=1950 basin urban population, new definition, as a percent of basin total population.

b=1950 urban population of representative States as a percent of total population of the representative States.

The Bureau of the Census estimated urban population (1950 definition), by States for 1970, 1980, and 2000 consistent with their estimates of total State population for series II and IV and for migration assumptions No. 1 and No. 2. For each representative group of States it was possible to estimate the ratio of urban to total population for the various years and migration assumptions utilized above. Urban basin population for 1980 was then estimated by the relationship

$c\frac{a}{b}$=Percent of total basin population that is urban

a, b—Defined as above.

c=The ratio of urban population to total population for 1980 in the representative States.

A similar procedure was followed for 2000. In this way urban population within the basin was assumed to vary in proportion to the variation in the relative importance of urban population in the representative States. The percentages of urban population thus projected are shown in table VI. The percentages were then applied to basin total populations to yield the urban populations shown in table VII.

TABLE VI.—*Urban population as percent of total population, 1970, 1980, 2000*

Water resource region	Migration assumption No. 1			Migration assumption No. 2		
	1970	1980	2000	1970	1980	2000
New England	77.4	78.4	80.7	75.6	75.0	74.4
Delaware and Hudson	89.0	90.3	93.1	86.9	86.1	85.6
Chesapeake Bay	67.7	70.1	75.0	66.7	68.0	70.4
Southeast	54.8	59.0	66.0	52.6	55.2	59.6
Eastern Great Lakes	79.3	80.7	84.0	77.4	77.1	77.4
Western Great Lakes	78.4	79.9	83.0	76.6	76.4	76.6
Ohio River	56.4	58.1	61.2	55.0	55.2	54.5
Cumberland	39.5	42.1	47.2	38.6	40.3	43.5
Tennessee	36.9	39.7	44.8	36.3	38.1	41.7
Upper Mississippi	59.6	61.8	65.9	58.2	59.0	60.7
Lower Mississippi	56.3	61.6	70.6	54.4	57.9	63.9
Upper Missouri	55.9	60.4	68.3	54.2	57.2	62.3
Lower Missouri	57.8	61.4	68.0	56.5	58.7	62.6
Upper Arkansas-Red	64.9	69.5	77.3	63.3	66.3	71.3
Lower Arkansas-White-Red	50.3	55.0	62.9	48.6	51.8	57.0
Western Gulf	75.3	80.6	89.2	73.6	77.0	82.2
Upper Rio Grande and Pecos	66.7	71.2	78.5	65.3	68.2	72.5
Colorado	52.3	54.2	57.9	51.0	51.8	53.3
Great Basin	71.7	75.5	82.5	70.1	72.3	76.2
Pacific Northwest	59.9	61.9	65.7	58.7	59.2	60.7
Central Pacific	71.1	72.1	74.5	69.3	68.9	68.6
South Pacific	91.0	92.1	94.9	88.9	88.2	87.6
United States	69.2	72.0	76.5	67.1	68.0	69.6

TABLE VII.—*Projected urban population by water resource regions*

[In millions]

Water resource region	Migration assumption No. 1									Migration assumption No. 2								
	Low			Middle			High			Low			Middle			High		
	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
New England	8.0	8.9	10.3	8.3	9.6	12.8	8.9	10.9	16.7	8.2	8.8	10.1	8.4	9.6	12.5	9.0	10.9	16.3
Delaware and Hudson	23.0	25.7	30.9	23.8	27.9	38.2	25.5	31.8	50.0	22.3	24.3	28.1	23.0	26.3	34.7	24.7	30.0	45.3
Chesapeake Bay	7.7	9.0	11.5	7.9	9.7	14.2	8.5	11.1	18.5	7.6	8.7	10.7	7.9	9.4	13.2	8.4	10.7	17.2
Southeast	12.7	15.2	20.0	13.0	16.5	24.7	14.0	18.7	32.3	12.1	14.4	18.6	12.5	15.6	22.9	13.4	17.7	30.0
Eastern Great Lakes	11.7	13.6	17.1	12.1	14.8	21.2	12.9	16.8	27.7	11.3	12.6	15.2	11.6	13.7	18.9	12.5	15.7	24.7
Western Great Lakes	12.2	14.1	17.3	12.6	15.2	21.4	13.5	17.3	28.0	11.7	13.1	15.5	12.0	14.1	19.1	12.9	16.1	25.0
Ohio River	11.0	12.3	14.8	11.3	13.4	18.3	12.1	15.2	23.9	10.9	12.1	13.8	11.3	13.1	17.1	12.1	14.9	22.4
Cumberland	.5	.5	.6	.5	.6	.8	.5	.6	1.0	.5	.6	.7	.5	.6	.9	.6	.7	1.1
Tennessee	1.1	1.3	1.6	1.2	1.4	2.0	1.3	1.6	2.6	1.2	1.4	1.8	1.2	1.5	2.1	1.3	1.7	2.8
Upper Mississippi	8.0	9.0	11.0	8.2	9.8	13.6	8.8	11.1	17.8	7.8	8.7	10.4	8.0	9.4	12.8	8.6	10.7	16.8
Lower Mississippi	2.6	3.0	3.8	2.6	3.2	4.7	2.9	3.7	6.1	2.7	3.2	4.2	2.8	3.5	5.1	3.0	3.9	6.7
Upper Missouri	3.8	4.4	5.7	3.9	4.8	7.0	4.2	5.4	9.2	3.7	4.3	5.4	3.8	4.6	6.7	4.1	5.3	8.8
Lower Missouri	1.3	1.5	1.7	1.4	1.6	2.1	1.5	1.8	2.7	1.4	1.5	1.7	1.4	1.6	2.1	1.5	1.8	2.7
Upper Arkansas-Red	2.3	2.6	3.1	2.4	2.8	3.8	2.6	3.2	4.9	2.3	2.7	3.1	2.4	2.9	3.9	2.6	3.2	5.1
Lower Arkansas-White-Red	1.9	2.0	2.4	2.0	2.2	3.0	2.1	2.5	3.8	2.0	2.3	2.9	2.1	2.5	3.5	2.3	2.6	4.6
Western Gulf	7.8	9.5	12.8	8.0	10.3	15.7	8.5	11.8	20.6	7.4	8.9	11.6	7.7	9.6	14.3	8.2	11.0	18.7
Upper Rio Grande and Pecos	1.1	1.4	2.0	1.1	1.5	2.4	1.2	1.7	3.2	1.0	1.4	1.9	1.1	1.5	2.3	1.2	1.7	3.0
Colorado	1.3	1.6	2.3	1.3	1.8	2.9	1.4	2.1	3.8	1.1	1.4	1.8	1.2	1.5	2.2	1.2	1.7	2.9
Great Basin	.9	1.1	1.6	.9	1.3	1.9	1.0	1.4	2.6	.8	1.1	1.4	.9	1.2	1.7	1.0	1.3	2.2
Pacific Northwest	3.8	4.6	6.0	3.9	5.0	7.4	4.1	5.6	9.7	3.8	4.3	5.4	3.9	4.7	6.6	4.2	5.3	8.7
Central Pacific	6.4	8.0	10.7	6.6	8.7	13.2	7.1	9.9	17.3	5.9	6.9	8.5	6.1	7.5	10.5	6.5	8.5	13.7
South Pacific	9.6	12.2	17.0	9.9	13.3	20.9	10.6	15.1	27.3	8.8	10.6	13.5	9.1	11.5	16.9	9.8	13.1	21.8
United States	139.0	162.0	204.0	143.0	175.0	252.0	153.0	200.0	330.0	135.0	153.0	186.0	139.0	166.0	230.0	149.0	189.0	300.0

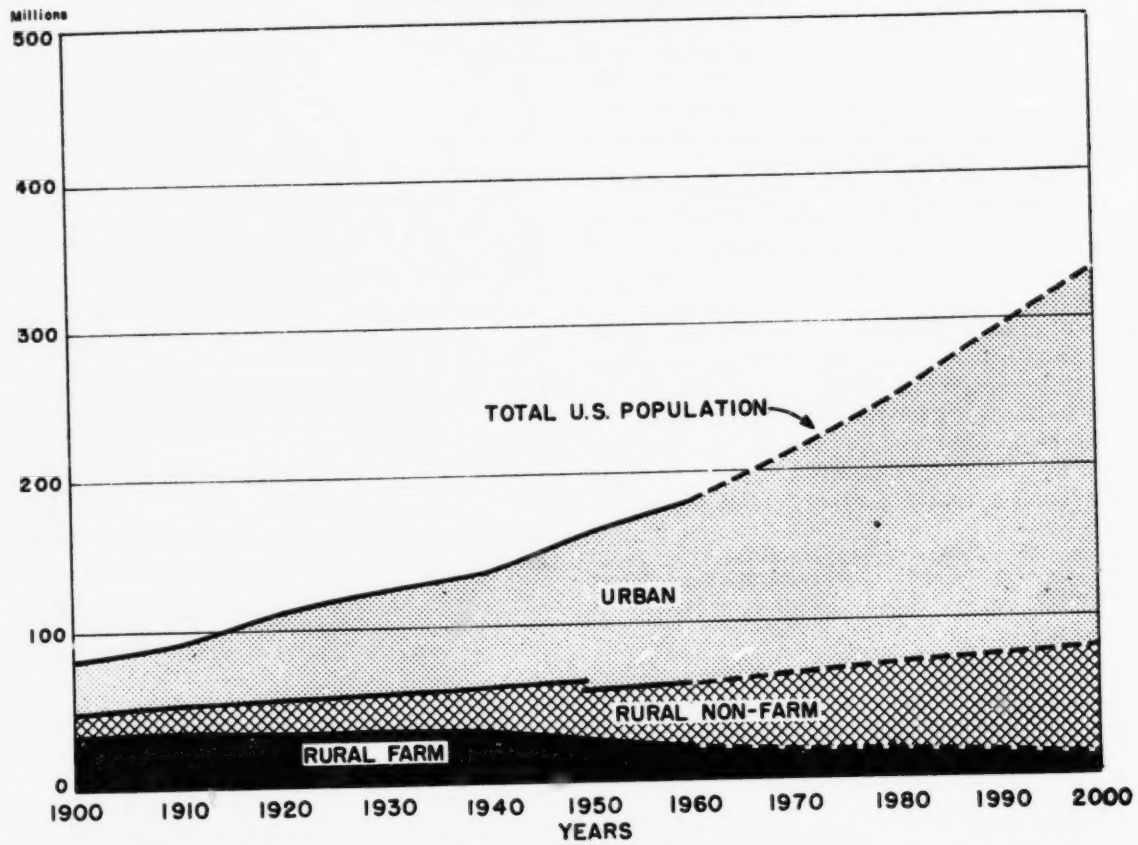
This procedure was adopted rather than a projection directly of basin urban population mainly because of a change in definition of "urban" in the 1950 census. Because of this change there was only a single year's figures based on the present definitions.

Other techniques of projection were attempted and their results will be described in a later publication by Resources for the Future. The preliminary projections supplied to participants in other studies for the committee yielded larger urban populations than were given by the method described above.

The past and projected growth of the total urban and rural population in the period 1900–2000 is shown by figure IV.

FIGURE IV

TOTAL URBAN AND RURAL POPULATION, PAST AND PROJECTED GROWTH, 1900–2000, MIDDLE RANGE, MIGRATION ASSUMPTION NO. 1



NOTE: The change in the urban–rural definition in 1950 resulted in an increase in the urban population of 7.5 million.

From: Census Reports and Table VII.

Projection of total standard metropolitan area population in each region

Estimated population in standard metropolitan areas for each region was computed for 1930, 1940, 1950, and 1958 [3] on the basis of the population in the counties and other local jurisdictions that were designated as components of standard metropolitan areas in 1950. In other words the population was measured with reference to the same geographic areas for each decennial year and 1958, in spite of the fact that certain areas would not have met the requirements for designation as a standard metropolitan area in one or more of the census years prior to 1950. The recorded percentages and projections of the future percentages are shown in table VIII.

The projections were made as follows:

The change in the percent of total population in standard metropolitan areas between 1950 and 1958 was added to the 1958 percent to yield the estimated value for 1970. The change in the percent of total population in standard metropolitan areas between 1940 and 1958 was added to the 1970 value to yield the estimated value for 2000. The figure for 1980 was calculated on the basis of a straight-line interpolation between 1970 and 2000. The resulting percentages were then applied to the projected total population figures for each basin and the results are shown in table IX. Figure V shows the past and projected increase of all the standard metropolitan areas from 1900 to 2000 under migration assumption No. 1.

[3] Sources: 1930, 1940, and 1950, Census of Population, Bureau of the Census; 1958, "Uniform Crime Reports for the United States," 1958, Federal Bureau of Investigation.

TABLE VIII.—*Total standard metropolitan area population as percent of total population, by water resource region, 1930–2000* [1]

Water resource region	1930	1940	1950	1958	1970	1980	2000
New England	79.58	79.11	79.09	78.89	78.69	78.62	78.47
Delaware and Hudson	93.64	93.65	93.73	93.88	94.03	94.11	94.26
Chesapeake Bay	56.88	58.80	61.76	63.72	65.68	67.32	70.60
Southeast	24.73	26.74	31.42	35.88	40.34	43.39	49.48
Eastern Great Lakes	68.69	69.07	70.61	71.92	73.23	74.18	76.08
Western Great Lakes	73.81	73.12	73.73	76.34	78.95	80.02	82.17
Ohio River	46.93	46.77	49.05	51.34	53.63	55.15	58.20
Cumberland	21.99	22.68	27.10	29.99	32.88	35.32	40.19
Tennessee	21.47	21.94	24.96	26.04	27.12	29.49	31.22
Upper Mississippi	35.75	36.49	40.[illegible]	42.87	45.70	47.83	52.08
Lower Mississippi	25.46	26.13	32.[illegible]	37.16	42.03	45.69	53.04
Upper Missouri	19.75	21.64	25.11	28.79	32.47	34.85	39.62
Lower Missouri	34.41	35.61	41.85	49.26	56.67	61.22	70.32
Upper Arkansas-Red	17.44	19.71	28.57	34.65	42.73	47.71	57.67
Lower Arkansas-White-Red	13.77	14.42	18.35	24.80	31.25	34.71	41.63
Western Gulf	33.94	38.02	47.41	54.80	62.19	67.78	78.97
Upper Rio Grande and Pecos	30.57	28.29	35.45	39.86	44.27	48.13	55.84
Colorado	19.84	21.23	28.26	33.46	38.66	42.74	50.89
Great Basin	42.27	42.56	45.60	47.68	49.76	51.47	54.88
Pacific Northwest	40.35	39.21	42.08	43.23	44.38	45.72	48.40
Central Pacific	67.97	64.93	66.24	66.24	66.24	67.92	71.29
South Pacific	93.00	93.16	93.15	93.15	93.15	93.43	100.00
United States	52.75	53.34	56.74	59.68	62.58	64.69	68.92

[1] For 1930 and 1940 the figures are of the population of geographic areas defined as a standard metropolitan area in 1950, whether or not such areas would have met the conditions for designation as a standard metropolitan area in the earlier years.

TABLE IX.—*Projected population, all standard metropolitan areas by water resource region*

[In millions]

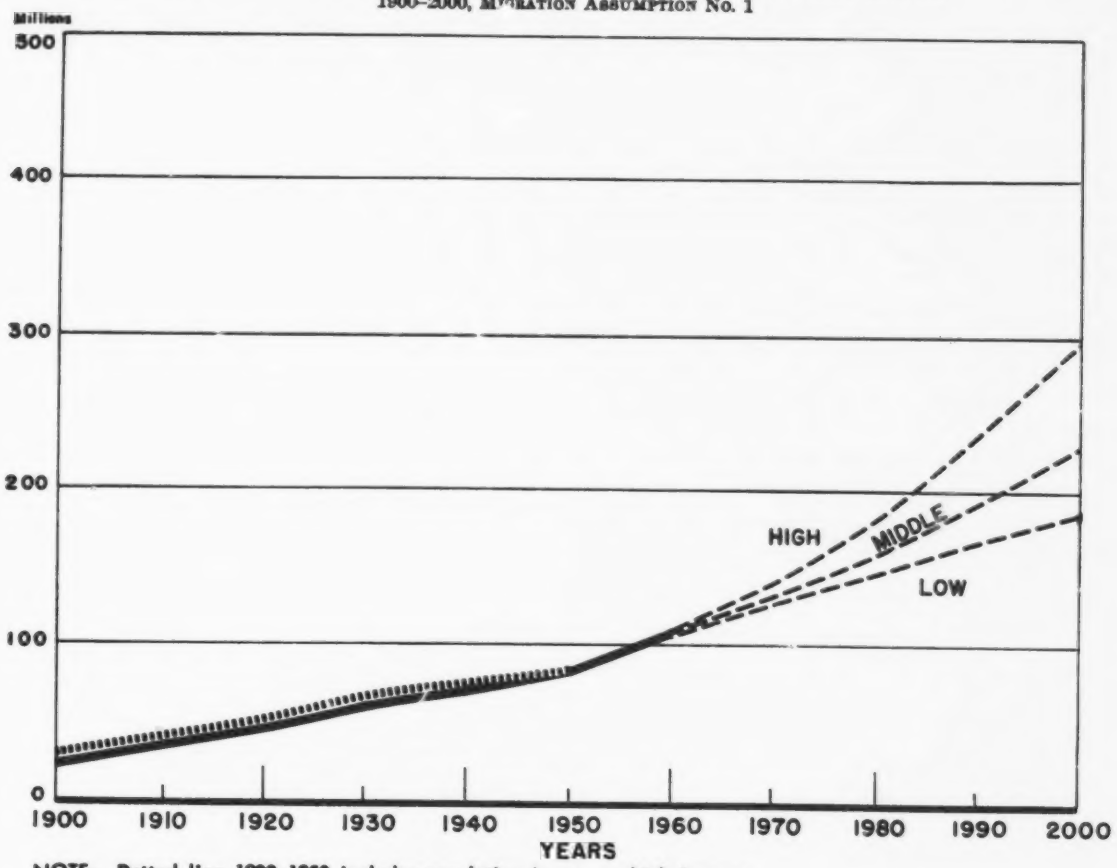
Water resource region	Migration assumption No. 1									Migration assumption No. 2								
	Low			Middle			High			Low			Middle			High		
	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
New England	8.2	8.9	10.0	8.4	9.6	12.4	9.0	10.9	16.2	8.5	9.3	10.7	8.7	10.1	13.2	9.4	11.4	17.2
Delaware and Hudson	24.4	26.8	31.3	25.1	28.1	38.6	26.9	33.1	50.6	24.2	26.5	30.9	24.9	28.8	38.2	25.7	32.8	49.9
Chesapeake Bay	7.5	8.6	10.8	7.7	9.4	13.3	8.3	10.6	17.4	7.5	8.6	10.7	7.8	9.3	13.2	8.3	10.6	17.3
Southeast	9.3	11.2	15.0	9.6	12.1	18.5	10.3	13.8	24.2	9.3	11.3	15.4	9.6	12.2	19.0	10.2	13.9	24.9
Eastern Great Lakes	10.8	12.5	15.6	11.1	13.6	19.2	11.9	15.4	25.1	10.7	12.2	15.0	11.0	13.2	18.6	11.8	15.1	24.3
Western Great Lakes	12.3	14.1	17.2	12.7	15.2	21.2	13.6	17.4	27.7	12.1	13.7	16.6	12.4	14.8	20.5	13.3	16.9	26.8
Ohio River	10.5	11.6	14.1	10.8	12.6	17.4	11.5	14.4	22.8	10.7	12.1	14.8	11.0	13.1	18.3	11.8	14.9	23.9
Cumberland	.4	.4	.5	.4	.5	.7	.4	.5	.9	.4	.5	.6	.5	.5	.8	.5	.6	1.0
Tennessee	.8	.9	1.1	.9	1.0	1.4	.9	1.1	1.8	.9	1.0	1.3	.9	1.1	1.6	1.0	1.3	2.1
Upper Mississippi	6.1	7.0	8.7	6.3	7.6	10.4	6.8	8.6	14.1	6.1	7.0	8.9	6.3	7.6	11.0	6.8	8.7	14.4
Lower Mississippi	1.9	2.2	2.9	2.0	2.4	3.6	2.1	2.7	4.6	2.1	2.5	3.4	2.2	2.7	4.2	2.4	3.1	5.6
Upper Missouri	2.2	2.5	3.3	2.3	2.8	4.0	2.4	3.1	5.3	2.2	2.6	3.4	2.3	2.8	4.3	2.4	3.2	5.6
Lower Missouri	1.3	1.5	1.8	1.4	1.6	2.2	1.5	1.8	2.8	1.4	1.5	1.9	1.4	1.7	2.3	1.5	1.8	3.0
Upper Arkansas-Red	1.5	1.8	2.3	1.6	1.9	2.8	1.7	2.2	3.7	1.6	1.9	2.5	1.6	2.1	3.1	1.8	2.3	4.1
Lower Arkansas-White-Red	1.2	1.3	1.6	1.2	1.4	2.0	1.3	1.6	2.5	1.3	1.6	2.1	1.3	1.7	2.6	1.5	1.9	3.4
Western Gulf	6.4	8.0	11.3	6.6	8.7	13.9	7.2	9.9	18.2	6.3	7.9	11.1	6.5	8.5	13.7	6.9	9.7	17.9
Upper Rio Grande and Pecos	.7	.9	1.4	.8	1.0	1.7	.8	1.2	2.3	.7	1.0	1.5	.8	1.1	1.8	.8	1.2	2.3
Colorado	.9	1.3	2.0	1.0	1.4	2.5	1.0	1.6	3.3	.8	1.2	1.7	.9	1.2	2.1	.9	1.4	2.8
Great Basin	.6	.8	1.0	.6	.9	1.3	.7	1.0	1.7	.6	.8	1.0	.6	.8	1.2	.7	.9	1.6
Pacific Northwest	2.8	3.3	4.4	2.9	3.7	5.5	3.1	4.2	7.1	2.8	3.3	4.3	2.9	3.6	5.3	3.2	4.1	6.9
Central Pacific	6.0	7.5	10.3	6.2	8.2	12.6	6.6	9.3	16.5	5.6	6.8	8.8	5.8	7.4	10.9	6.2	8.4	14.3
South Pacific	9.8	12.7	17.9	10.2	13.7	22.0	10.8	15.7	28.8	9.2	11.5	15.4	9.5	12.4	19.0	10.2	14.1	24.9
United States	126.0	146.0	184.0	130.0	158.0	227.0	139.0	180.0	297.0	125.0	145.0	182.0	129.0	157.0	225.0	138.0	178.0	294.0

Projection of selected standard metropolitan area populations

The percent of total standard metropolitan area population found in each of the selected metropolitan areas within each region was computed for censuses of 1910 to 1950 and for the 1958 figures. These are shown in table X.

FIGURE V

POPULATION OF ALL STANDARD METROPOLITAN AREAS, PAST AND PROJECTED GROWTH, 1900–2000, MIGRATION ASSUMPTION No. 1



NOTE: Dotted line 1900–1950 includes population in areas which became standard metropolitan areas in 1950.

TABLE X.—*Selected standard metropolitan area population as percent of total standard metropolitan area population in water resource region*

	1910	1920	1930	1940	1950	1958	1970	1980	2000
New England:									
Boston	41.87	41.08	41.32	40.87	40.06	38.52	37.34	36.56	34.99
Hartford	5.17	5.96	6.66	6.92	7.52	8.22	8.87	9.30	10.17
Delaware and Hudson:									
New York [1]	63.99	64.86	66.73	67.76	67.27	66.86	66.41	66.11	65.51
Philadelphia	20.59	20.73	19.23	18.59	19.13	19.45	19.86	20.17	20.74
Albany-Schenectady-Troy	3.48	3.12	2.84	2.71	2.68	2.61	2.56	2.53	2.46
Chesapeake Bay:									
Washington	15.97	17.20	17.86	22.70	27.73	30.74	34.76	37.44	42.80
Richmond	6.17	6.34	6.30	6.17	6.21	6.44	6.58	6.67	6.85
Southeast:									
Birmingham	12.50	13.51	13.67	12.10	10.83	8.84	7.21	6.12	3.95
Columbia, S.C	3.06	3.40	2.79	2.76	2.77	3.34	3.63	3.82	4.21
Eastern Great Lakes: Detroit	22.42	30.65	37.43	38.96	40.99	43.16	45.26	46.66	49.46
Western Great Lakes:									
Chicago [1]	65.99	66.24	67.01	66.54	66.08	64.29	63.16	62.41	60.91
Lansing	1.27	1.54	1.68	1.81	2.08	2.15	2.32	2.43	2.66
Ohio:									
Cincinnati	12.86	11.34	11.46	11.28	11.38	11.52	11.64	11.72	11.88
Indianapolis	5.75	6.28	6.41	6.61	6.95	7.43	7.82	8.06	8.61
Cumberland: Nashville	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Tennessee: Chattanooga	38.18	38.29	37.65	37.39	34.79	34.72	33.38	32.49	30.71
Upper Mississippi:									
Cedar Rapids	2.58	2.65	2.46	2.47	2.44	2.52	2.54	2.56	2.59
St. Louis	42.47	40.84	40.84	39.74	39.42	39.59	39.52	39.47	39.37
Lower Mississippi: New Orleans	61.63	60.70	57.45	55.31	51.70	50.12	47.52	45.79	42.33
Upper Missouri:									
Denver	34.54	34.65	35.16	37.53	42.41	47.98	53.20	56.68	63.65
Sioux City	9.51	10.66	10.16	9.57	7.82	6.75	5.34	4.40	2.52
Lower Missouri: Kansas City	81.94	84.91	87.06	87.96	89.35	90.64	91.96	92.87	94.66
Upper Arkansas-Red:									
Oklahoma City	35.12	32.31	40.29	41.28	39.54	38.01	36.38	35.29	33.11
Amarillo	6.61	5.57	9.62	10.32	10.56	11.90	12.69	13.22	14.27
Lower Arkansas-White-Red: Little Rock	35.66	29.46	25.84	26.44	26.95	26.33	26.28	26.24	26.17
Western Gulf:									
Houston	15.28	17.03	20.88	24.48	24.73	25.62	26.19	26.57	27.33
Dallas	17.92	19.22	18.96	18.46	18.85	18.66	18.76	18.83	18.96
Fort Worth	14.36	13.93	11.52	10.46	11.06	13.05	14.34	15.20	16.93
San Antonio	15.81	18.40	17.04	15.64	15.32	12.44	12.34	11.61	10.14
Upper Rio Grande-Pecos: Albuquerque	31.17	22.73	25.42	34.50	42.82	42.27	46.16	48.75	53.93
Colorado:									
Phoenix	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Grand Junction [2]				4.14	2.61	2.68			
Great Basin: Salt Lake City	78.92	78.71	78.86	78.81	76.82	78.22	77.92	77.72	
Pacific Northwest:									
Portland	35.81	35.62	36.90	37.03	36.42	36.73	36.58	36.48	36.28
Spokane	16.37	13.47	12.16	12.20	11.47	12.04	11.96	11.91	11.80
Central Pacific: San Francisco	73.50	71.56	71.62	68.96	68.18	63.06	60.11	58.14	54.21
South Pacific: Los Angeles	81.91	84.36	87.12	86.63	83.90	79.26	75.58	73.12	68.21

[1] Consolidated area.

[2] Not a standard metropolitan area. 1940 urban population adjusted to 1950 definition. 1958 population estimated from 1957 population as given by Rand-McNally. Population projected in relation to total urban population of basin. Figure shown is percent of basin urban population, 1950 definition.

Because of the comparative instability of this relationship in comparison with the changes in the ratio of regional total standard metropolitan area population to total population in the region, a different method of projection was adopted:

The changes in the ratios,

$$\frac{\text{Selected SMA population}}{\text{All SMA population in water resource region}},$$

between 1940 and 1950 and between 1950 and 1958 were averaged, giving each change equal weight. The average was added algebraically to the 1958 ratio to yield the percent estimated for 1970. The sum of the percentage changes between 1940–50 and 1950–58 was added to the 1970 value to yield the value for 2000. The figures for 1980 were calculated by interpolation. These percents were then applied to the total population of the standard metropolitan area, in the respective region to yield the populations of the selected standard metropolitan areas. The population figures for 1940, 1950, and 1958 and the projections under migration assumptions 1 and 2 are shown in table XI.

TABLE XI.—*Selected standard metropolitan areas, population in millions*

Metropolitan area	U.S. census figures			Migration assumption No. 1									Migration assumption No. 2								
				Low			Middle			High			Low			Middle			High		
	1940	1950	1958	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
New England:																					
Boston	2.7	2.9	3.0	3.1	3.3	3.5	3.1	3.5	4.3	3.4	4.0	5.7	3.2	3.4	3.7	3.2	3.7	4.6	3.5	4.2	6.0
Hartford	.5	.5	.6	.7	.8	1.0	.7	.9	1.3	.8	1.0	1.6	.8	.9	1.1	.8	.9	1.3	.8	1.1	1.7
Delaware and Hudson:																					
New York[1]	11.7	12.9	14.4	16.2	17.7	20.5	16.7	19.2	25.3	17.9	21.9	33.1	16.1	17.5	20.2	16.5	19.0	[illegible]0	17.7	21.7	32.7
Philadelphia	3.2	3.7	4.2	4.9	5.4	6.5	5.0	5.9	8.0	5.3	6.7	10.5	4.8	5.3	6.4	5.0	5.8	[illegible].9	5.3	6.6	10.3
Albany-Schenectady-Troy	.5	.5	.6	.6	.7	.8	.6	.7	.9	.7	.8	1.2	.6	.7	.8	.6	.7	.9	.7	.8	1.2
Chesapeake Bay:																					
Washington, D.C.	1.0	1.5	1.9	2.6	3.2	4.6	2.7	3.5	5.7	2.9	4.0	7.4	2.6	3.2	4.6	2.7	3.5	5.6	2.9	4.0	7.4
Richmond	.3	.3	.4	.5	.6	.7	.5	.6	.9	.5	.7	1.2	.5	.6	.7	.5	.6	.9	.5	.7	1.2
Southeast:																					
Birmingham[2]	.5	.6	.6	.8	.9	1.2	.8	1.0	1.5	.9	1.2	1.9	.7	.9	1.2	.8	1.0	1.5	.8	1.1	2.0
Columbia[2]	.1	.1	.2	.3	.4	.6	.3	.5	.8	.4	.5	1.0	.3	.4	.6	.3	.5	.8	.4	.5	1.0
Eastern Great Lakes: Detroit	2.4	3.0	3.9	4.9	5.8	7.7	5.0	[illegible]	9.5	5.4	7.2	12.4	4.8	5.7	7.4	5.0	6.2	9.2	5.3	7.0	12.0
Western Great Lakes:																					
Chicago[1]	4.8	5.5	6.5	7.8	8.8	10.5	8.0	9.5	12.9	8.6	10.9	16.9	7.6	8.6	10.1	7.8	9.2	12.5	8.4	10.5	16.3
Lansing	.1	.2	.2	.3	.3	.5	.3	.4	.6	.3	.4	.7	.3	.3	.4	.3	.4	.5	.3	.4	.7
Ohio:																					
Cincinnati	.8	.9	1.0	1.2	1.4	1.7	1.3	1.5	2.1	1.3	1.7	2.7	1.2	1.4	1.8	1.3	1.5	2.2	1.4	1.7	2.8
Indianapolis	.5	.6	.7	.8	.9	1.2	.8	1.0	1.5	.9	1.2	2.0	.8	1.0	1.3	.9	1.1	1.6	.9	1.2	2.1
Cumberland: Nashville	.3	.3	.4	.4	.4	.5	.4	.5	.7	.4	.5	.9	.4	.5	.6	.5	.5	.8	.5	.6	1.0
Tennessee: Chattanooga	.2	.2	.3	.3	.3	.3	.3	.3	.4	.3	.4	.6	.3	.3	.4	.3	.4	.5	.3	.4	.6
Upper Mississippi:																					
Cedar Rapids	.09	.1	.1	.2	.2	.2	.2	.2	.3	.2	.2	.4	.2	.2	.2	.2	.2	.3	.2	.2	.4
St. Louis	1.4	1.7	2.0	2.4	2.8	3.4	2.5	3.0	4.1	2.7	3.4	5.6	2.4	2.8	3.5	2.5	3.0	4.3	2.7	3.4	5.7
Lower Mississ', pi: New Orleans	.6	.7	.8	.9	1.0	1.2	1.0	1.1	1.5	1.0	1.2	1.9	1.0	1.1	1.4	1.0	1.2	1.8	1.1	1.4	2.4
Upper Missouri:																					
Denver	.4	.6	.8	1.2	1.4	2.1	1.2	1.6	2.5	1.3	1.8	3.4	1.2	1.5	2.2	1.2	1.6	2.7	1.3	1.8	3.6
Sioux City	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
Lower Missouri: Kansas City	.7	.8	1.0	1.2	1.4	1.7	1.3	1.5	2.1	1.4	1.7	2.6	1.3	1.4	1.8	1.3	1.6	2.2	1.4	1.7	2.8
Upper Arkansas-Red:																					
Oklahoma City	.2	.3	.4	.5	.6	.8	.6	.7	.9	.6	.8	1.2	.6	.7	.8	.6	.7	1.0	.7	.8	1.4
Amarillo	.06	.09	.1	.2	.2	.3	.2	.3	.4	.2	.3	.5	.2	.3	.4	.2	.3	.4	.2	.3	.6
Lower Arkansas-White-Red: Little Rock	.2	.2	.3	.3	.3	.4	.3	.4	.5	.3	.4	.7	.3	.4	.5	.3	.4	.7	.4	.5	.9
Western Gulf:																					
Houston	.5	.8	1.2	1.7	2.1	3.1	1.7	2.3	3.8	1.9	2.6	5.0	1.6	2.1	3.0	1.7	2.3	3.7	1.8	2.6	4.9
Dallas	.4	.6	.9	1.2	1.5	2.1	1.2	1.6	2.6	1.4	1.9	3.5	1.2	1.5	2.1	1.2	1.6	2.6	1.3	1.8	3.4
Fort Worth	.2	.4	.6	.9	1.2	1.9	.9	1.3	2.4	1.0	1.5	3.1	.9	1.2	1.9	.9	1.3	2.3	1.0	1.5	3.0
San Antonio	.3	.5	.6	.8	.9	1.1	.8	1.0	1.4	.9	1.1	1.8	.8	.9	1.1	.8	1.0	1.4	.9	1.1	1.8
Upper Rio Grande and Pecos: Albuquerque	.07	.1	.2	.3	.4	.8	.4	.5	.9	.4	.6	1.2	.3	.5	.8	.4	.5	1.0	.4	.6	1.2
Colorado:																					
Phoenix	.2	.3	.5	.9	1.3	2.0	1.0	1.4	2.5	1.0	1.6	3.3	.8	1.2	1.7	.9	1.2	2.1	.9	1.4	2.8
Grand Junction[3]	.01	.02	.02	.02	.03	.03	.02	.03	.03	.02	.03	.03	.02	.03	.03	.02	.03	.03	.02	.03	.03
Great Basin: Salt Lake City	.2	.3	.4	.5	.6	.8	.5	.7	1.0	.5	.8	1.3	.5	.6	.8	.5	.6	.9	.5	.7	1.2

Pacific Northwest:																					
Portland	.5	.7	.0	1.0	1.2	1.6	1.1	1.3	2.0	1.1	1.5	2.6	1.0	1.2	1.6	1.1	1.3	1.9	1.2	1.5	2.5
Spokane	.2	.2	.3	.3	.4	.5	.3	.4	.6	.4	.5	.8	.3	.4	.5	.3	.4	.6	.4	.5	.8
Central Pacific: San Francisco	1.5	2.2	2.7	3.6	4.4	5.6	3.7	4.8	6.8	4.0	5.4	8.9	3.4	4.0	4.8	3.5	4.3	5.9	3.7	4.9	7.8
South Pacific: Los Angeles	2.9	4.4	6.2	7.4	9.3	12.2	7.7	10.0	15.0	8.2	11.5	19.6	7.0	8.4	10.5	7.2	9.1	13.0	7.7	10.3	17.0

[1] Consolidated area.

[2] Projection of Birmingham's population by the same method as used for all other selected standard metropolitan areas yields 1970 and 1980 values of 700,000, and 2000 values ranging from 700,000 for "low" to 1,000,000 for "high." These figures obviously understate Birmingham's growth and have been rep...ced by a projection based on Birmingham's development in recent decades. On the other hand, the figures in the table probably overstate Columbia's growth.

[3] Not a standard metropolitan area. Population independently projected. No adjustment for potential growth based on development of oil shale extraction.

CONCLUSION

The shortcut methods detailed here yield results which are adequate for broad studies such as those being undertaken for the committee. Far more detailed population projections are needed as a basis for actual project decisions.

ACKNOWLEDGMENTS

Valuable suggestions with respect to the population studies were furnished by Mr. Jacob S. Siegel, Chief of the Population Estimates and Projections Branch, and Dr. Conrad Taeuber, Assistant Director of the U.S. Bureau of the Census, who worked with the staff of the Select Committee on National Water Resources and were responsible for the projections furnished the committee by the Census Bureau. Resources for the Future's part of the study was under the direction of Dr. Nathaniel Wollman, on leave from the department of economics, University of New Mexico. National total population figures for 1980 and 2000 were taken from a forthcoming publication of Resources for the Future, tentatively called "Resources in the American Future." Most of the work on population projections was performed by Vera F. Eliasberg, who also made a detailed comparison of the Resources for the Future projections with the Census Bureau projections, which is printed as Part III hereof. A great deal of assistance on population projections was also furnished by Erna Peters and Peter Dyer, of the Resources for the Future staff. Irving Fox, Associate Director, and Joseph Fisher, President and Executive Director of Resources for the Future have general responsibility for all the work being performed for the Senate Select Committee on National Water Resources.

COMMUNICATIONS

JUNE 18, 1959.

Hon. LEWIS L. STRAUSS,
Secretary of Commerce, The Department of Commerce, Washington, D.C.
(Attention: Mr. Robert W. Burgess, Director, Bureau of Census.)

MY DEAR MR. SECRETARY: Reference is made to my letter of June 15, 1959, concerning the work of the Select Committee on National Water Resources. One of the basic needs of the committee is for projections of the population of the United States and geographic subdivisions thereof.

The committee has great confidence in the abilities of the Bureau of the Census in this field, and for this reason it is requested that the Bureau develop population projections along the line stated below. While the committee would like to have just one set of projections, we would be able to work with high- and low-range projections, and so we would be happy to have them in the manner in which the Census Bureau is accustomed to furnishing its projections.

The information desired is as follows:

1. Projections of the total U.S. population for 1970, 1980, and 2000.
2. Projections for each State, at the same dates.
3. Projections for the following river basins, approximated by component counties: Arkansas-White-Red, Colorado, Columbia and Puget Sound depressions, lower Mississippi, Missouri, Ohio, Potomac, and Rio Grande.
4. Percentages of urban population for the United States and each State, with indication of trends in urban population.
5. Projected population for the following metropolitan areas: Albuquerque, Boston, Dallas-Fort Worth, Houston, Kansas City, Los Angeles, New York, Philadelphia, Phoenix, San Francisco, and Washington.

We would like this information to be made available in a summary report of not more than 10,000 words, with whatever tables, charts, appendixes, and graphic illustrations as may be considered necessary. It would be most helpful if this information could be furnished to the committee by October 1, 1959.

The committee staff will be happy to discuss with representatives of the Census Bureau any problem which may arise in the preparation of this material.

Sincerely yours,

ROB'T. S. KERR, *Chairman.*

DEPARTMENT OF COMMERCE,
BUREAU OF THE CENSUS,
Washington, January 13, 1960.

Mr. THEODORE M. SCHAD,
Staff Director, Senate Select Committee on Natural Water Resources,
Senate Office Building, Washington, D.C.

DEAR MR. SCHAD: I am sending you herewith the report on population projections requested in Senator Kerr's letter of June 18 to Mr. Lewis L. Strauss, the then Secretary of Commerce. The report consists of five detailed tables, four charts, a map, and a text describing and interpreting the several series of projections.

Your attention is directed especially to the introductory and concluding sections of the report, which discuss the limitations and qualifications pertaining to the figures. These sections emphasize the fact

that the figures represent merely extensions of past trends. They should not, therefore, be interpreted as predictions. Because of the kinds and quality of data presented, most of the data included in the report are to be considered unofficial. They should not, therefore, be attributed to the Bureau of the Census.

A proper interpretation of the figures requires that account be taken of the specific assumptions on which they are based. It is recommended that, whenever any use is made of the figures, they be accompanied by a brief note describing the assumptions used in their preparation.

If you have any questions regarding this material, we should be pleased to discuss them with you.

Sincerely yours,

CONRAD TAEUBER,
Assistant Director, Bureau of the Census.

SELECTED RIVER BASINS AND METROPOLITAN AREAS

SOURCE: Based in part on U.S. Bureau of the Census, 1954 Census of Manufactures, Bulletin Mc-209, Industrial Water Use, and U.S. Bureau of the Budget, Standard Metropolitan Statistical Areas, 1959. See tables 4 and 7.

LEGEND:
— RIVER BASIN BOUNDARY
★ METROPOLITAN AREA

PART II. POPULATION PROJECTIONS

(By U.S. Bureau of the Census)

INTRODUCTORY NOTE

On June 18, 1959, Senator Robert S. Kerr, chairman of the Senate Select Committee on National Water Resources, wrote Lewis L. Strauss, the then Secretary of Commerce, requesting the Bureau of the Census to prepare certain population projections and an accompanying statement for the committee. The specific material requested by the committee was as follows:

1. Projections of population for 1970, 1980, and 2000 for the following areas:

   (*a*) Total United States.

   (*b*) Each State.

   (*c*) The following river basins: Arkansas-White-Red, Colorado, Columbia and Puget Sound depressions (Pacific Northwest), lower Mississippi, Missouri, Ohio, Potomac, and Rio Grande (upper area).

   (*d*) Urban population of the United States and each State.

   (*e*) The following metropolitan areas: Albuquerque, Boston, Dallas-Fort Worth, Houston, Kansas City, Los Angeles, New York, Philadelphia, Phoenix, San Francisco, and Washington, D.C.

2. A text statement describing and interpreting the projections.

At a meeting on July 10 attended by members of the committee staff and by representatives of the Bureau of the Census, an agreement was reached as to the specific kinds of data which the Bureau of the Census would provide the committee and the general basis by which these data would be derived. It was pointed out that projections of the total population of the United States (including Armed Forces abroad but excluding Alaska and Hawaii) were available in published form for the years 1970 and 1980 and that comparable projections for the year 2000 were available, although unpublished. Otherwise, except for certain projections of State population to the year 1970 which must now be considered outdated, projections were not available in the detail requested. It was agreed that the Bureau of the Census would prepare the additional projections in the short time allowed through such resources as were immediately at hand. Any projections made would represent merely extensions of past trends in some form and would not take account of any special developments which might have a major impact on population changes. Thus, the projections would assume that there would not be a major war or prolonged depression. Nor would they specifically allow for such important developments as the discovery of new resources, technological advances which might lead to the establishment of new industries, or other social and economic changes (e.g., change in our national immigration policy) which cannot be predicted on the basis of past changes and yet which might profoundly affect future population growth.

The Census Bureau representatives noted at the meeting that the tight time schedule and the shortage of trained staff would mean resorting to such simple and crude procedures that, in general, the results would be of less than minimal quality by Census Bureau standards. Projections for geographic subdivisions of the United States, especially for the urban-rural parts of States, for dates more than a few decades ahead would be particularly subject to error. It was noted further that any projections prepared in 1959 would be quickly outdated, since the 1960 census data would become available shortly. Projections made now would be based on estimates of current population derived from the 1950 census counts and estimates of change since that date.

In spite of the difficulties and qualifications noted, the committee staff felt that even crude projections representing a fairly mechanical extension of past trends would be useful for its work. The Census Bureau agreed to prepare the projections requested by the committee on these terms. The considerations discussed above should be borne in mind, therefore, in connection with any

use and interpretation of the projections included with this report. Because of the considerable uncertainties with regard to future population changes, several series of projections have been prepared for each type of area, alternative assumptions being employed with regard to one or more of the components of estimation.

PROJECTIONS OF THE TOTAL U.S. POPULATION

Table 1 shows national population estimates and projections for the years 1950 to 2000. Projections are given for every fifth year from 1960 on. These figures relate to 50 States and the District of Columbia in all years and include Armed Forces abroad. Four series of projections are shown based on alternative assumptions concerning the level of future fertility. The figures are approximately consistent with those shown in the Bureau of the Census report, Current Population Reports, Series P–25, No. 187. That report may be consulted for a fuller account of the underlying assumptions used in preparing the projections than is given here.

TABLE 1.—*Estimates and projections of the total population of the United States including Armed Forces abroad: July 1, 1950, to 2000*

[Figures in thousands. Projections are approximately consistent with figures given in Bureau of the Census, Current Population Reports, Series P–25, No. 187. Projections are based on current estimates for July 1, 1957. Figures relate to 50 States and the District of Columbia in all years]

Year	Estimates	Projections			
		Series I	Series II	Series III	Series IV
1950	152,264				
1955	165,932				
1957 [1]	171,945				
1960 [2]		181,937	180,903	180,515	180,187
1965		199,855	196,634	194,512	192,366
1970		220,502	214,807	209,164	203,743
1975		245,084	236,398	226,645	216,830
1980		273,937	261,288	246,630	231,983
1985		305,742	288,265	267,432	247,720
1990		340,369	317,300	288,439	263,136
1995		378,188	348,986	310,070	278,533
2000		419,521	383,782	332,830	294,678

[1] A revised estimate for July 1, 1957, is 171,914,000.

[2] A provisional estimate for July 1, 1959, is 177,702,000; and a tentative estimate for Jan. 1, 1960, is 179,300,000.

The fertility assumptions employed are as follows:

Series I: From 1958 to 1975–80, fertility averages 10 percent above the 1955–57 average; then fertility declines to the 1949–51 level by 2005–2010.

Series II: Fertility remains constant at the 1955–57 average level to 1975–80; fertility then declines to the 1949–51 level by 2005–2010.

Series III: Fertility declines from the 1955–57 level to the 1949–51 level by 1965–70 and remains at this level to 1975–80; then declines further to the 1942–44 level by 2005–10.

Series IV: Fertility declines from the 1955–57 level to the 1942–44 level by 1965–70, then remains at this level throughout the projection period to 2005–10.

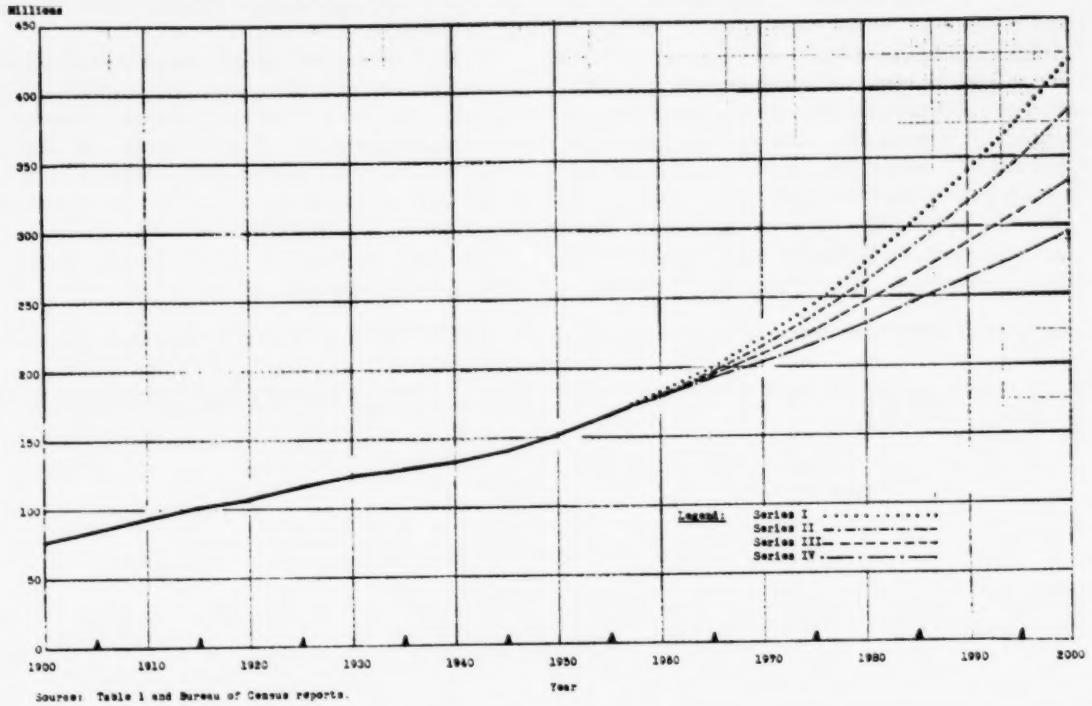
As the term is used here, fertility refers to a measure of birth performance which takes account of birth rates by age of women. The actual measure of fertility employed is the gross reproduction rate, which represents roughly the average number of daughters a woman would have by the end of the childbearing period according to the birth rates by age of women for the years indicated. The gross reproduction rates corresponding to the four fertility series in various years are as follows:

Series	1955–57	1975–80	2005–10
I	1.79	1.97	1.54
II	1.79	1.79	1.54
III	1.79	1.54	1.28
IV	1.79	1.28	1.28

Only one series of mortality assumptions is incorporated in all four population series. This series assumes moderate declines in mortality to the end of this century. Net immigration from abroad was assumed to be at a rate of about 300,000 per year for all series.

The population of the United States is expected to show large increases in the next several decades. These projections indicate a population of 232 to 274 million in 1980, and 295 to 420 million in the year 2000. This represents an increase of 50 to 95 million in the next 20 years and of 115 to 240 million in the next 40 years. If current growth rates should continue to the end of the century, the population then would be approximately double what it is in 1960. The four series of projections are presented graphically in figure 1.

Figure 1.--ESTIMATES AND PROJECTIONS OF THE TOTAL POPULATION OF THE UNITED STATES: 1900 TO 2000



Source: Table 1 and Bureau of Census reports.

The four series of projections show a wide range for our prospective population, suggesting a considerable uncertainty regarding the extent of our future population growth. The range of the 4 series reaches 40 million in 20 years and 125 million in 40 years. Even this range should not be interpreted as encompassing all possibilities of future growth. No allowance has been made for possible variation in future mortality or immigration. Even the assumptions regarding fertility were chosen, not to demarcate a range within which fertility is almost certain to remain, but to illustrate at least four possible alternatives. Fertility has varied greatly in the last 30 years and for part of that time was substantially less than any of the assumptions used here. Even if fertility does not fall outside the range now indicated by the projections, it is not safe to assume that it will follow closely any single series of assumptions. Particularly for the period after 1980, any assumptions regarding growth must be taken as quite speculative.

PROJECTIONS OF THE POPULATION OF STATES

As the next part of the discussion leads to projections for parts of the country as contrasted with the previous projections, which deal with the entire country, it seems appropriate to expand the remarks of the preceding paragraph, pointing out the uncertain character of population projections. The speculative character of the assumptions regarding national growth after 1980 applies with increased force to the tentative assumptions which underlie any projections of the population of States, river basins, and metropolitan areas. Incidental studies by the Census Bureau and other investigators have suggested certain general growth trends for States or other geographic units of particular types, but there is no approved body of knowledge which justifies confident prediction for 15 years or more into the future. Confidence in the results of this type of knowledge derived from past experience is impaired by the fact that

the growth of population in cities and similar areas is subject to unpredictable irregularities. Such irregularities may be accounted for, for instance, by shifts in channels of trade, development of new products, development of better sources of supply, control of important diseases by new drugs or new methods of treatment, changes in land use, fluctuations in economic conditions, and so on. The longer the period to which the projection is to apply, the more difficult it is to detect these changes in their early stages and appraise their influence correctly. Any plans which must be based on projections such as these should be reviewed and appropriate changes made at least every 10 years.

Table 2 shows population estimates and projections for States for the years 1958 to 2000. Specifically, the table gives provisional estimates of the total population of each State, for July 1, 1958, and four series of projections for 1970, 1980, and 2000. Figures are shown for 50 States and the District of Columbia and relate to the total population resident in each State, excluding Armed Forces abroad.

TABLE 2.—*Illustrative projections of the total population of States, 1970, 1980, and 2000, with comparative estimates for July 1, 1958*

[Figures in thousands. Figures relate to the total population residing in each State, i.e., the civilian population plus Armed Forces stationed in the State. Each population estimate has been independently rounded to the nearest thousand from figures computed to hundreds; hence, the sums of parts shown may differ slightly from the totals shown]

State	Apr. 1, 1950 (census)	July 1, 1958 [1]	Series II-1			Series II-2			Series IV-1			Series IV-2		
			1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
United States [2]	151,326	174,083	214,098	260,578	383,072	214,098	260,578	383,072	202,763	231,273	293,969	202,763	231,273	293,969
Regions:														
Northeast	39,478	43,041	49,876	58,851	83,691	50,638	59,821	85,284	47,361	52,288	64,162	48,100	53,163	65,415
North Central	44,461	51,009	62,724	75,879	110,727	62,153	75,178	109,768	59,429	67,360	84,949	58,851	66,681	84,139
The South	47,197	53,838	65,158	77,954	112,552	66,294	80,693	118,571	61,470	68,715	85,522	62,613	71,366	90,592
The West	20,190	26,196	36,339	47,895	76,102	35,015	44,888	69,448	34,504	42,911	59,336	33,200	40,063	53,823
Geographic divisions:														
New England	9,314	9,961	11,273	13,247	18,762	11,733	13,878	19,809	10,670	11,721	14,309	11,124	12,305	15,156
Middle Atlantic	30,164	33,080	38,603	45,604	64,929	38,905	45,943	65,475	36,691	40,567	49,853	36,976	40,858	50,259
East North Central	30,399	35,618	45,009	55,484	82,429	44,122	53,959	79,635	42,652	49,353	63,468	41,768	47,895	61,142
West North Central	14,061	15,391	17,715	20,395	28,298	18,032	21,219	30,133	16,776	18,007	21,481	17,083	18,786	22,997
South Atlantic	21,182	25,352	32,362	39,868	59,192	31,800	39,353	58,606	30,617	35,364	45,397	30,166	34,913	44,685
East South Central	11,477	11,947	12,863	14,306	19,175	14,046	16,553	23,541	12,077	12,434	14,227	13,250	14,573	17,843
West South Central	14,538	16,539	19,935	23,780	34,185	20,358	24,787	36,424	18,777	20,917	25,898	19,197	21,880	27,764
Mountain	5,075	6,494	8,915	11,459	17,750	8,538	10,865	16,685	8,419	10,180	13,680	8,050	9,625	12,811
Pacific	15,115	19,702	27,424	36,436	58,352	26,477	34,023	52,763	26,085	32,731	45,656	25,150	30,438	41,012
New England:														
Maine	914	952	1,035	1,185	1,633	1,111	1,307	1,854	975	1,040	1,230	1,051	1,155	1,411
New Hampshire	533	584	678	793	1,117	679	795	1,125	644	704	856	644	706	861
Vermont	378	372	371	414	557	431	504	712	347	359	412	407	444	540
Massachusetts	4,691	4,862	5,283	6,100	8,481	5,636	6,596	9,312	4,993	5,380	6,435	5,343	5,842	7,110
Rhode Island	792	875	1,011	1,178	1,652	1,013	1,181	1,661	963	1,050	1,270	964	1,052	1,276
Connecticut	2,007	2,316	2,895	3,577	5,322	2,863	3,494	5,145	2,748	3,188	4,106	2,715	3,107	3,958
Middle Atlantic:														
New York	14,830	16,229	18,846	22,257	31,658	18,991	22,350	31,734	17,934	19,830	24,350	18,065	19,893	24,376
New Jersey	4,835	5,749	7,378	9,131	13,609	7,082	8,623	12,668	7,027	8,170	10,551	6,734	7,692	9,778
Pennsylvania	10,498	11,101	12,379	14,216	19,662	12,832	14,970	21,073	11,730	12,567	14,952	12,177	13,273	16,105
East North Central:														
Ohio	7,947	9,345	11,865	14,714	21,978	11,653	14,317	21,220	11,236	13,083	16,922	11,024	12,702	16,288
Indiana	3,934	4,581	5,739	7,069	10,489	5,669	6,928	10,214	5,438	6,287	8,073	5,367	6,149	7,841
Illinois	8,712	9,889	12,081	14,554	21,119	11,896	14,268	20,645	11,464	12,944	16,233	11,279	12,668	15,835
Michigan	6,372	7,866	10,503	13,364	20,488	10,156	12,751	19,310	9,944	11,904	15,831	9,602	11,324	14,861
Wisconsin	3,435	3,983	4,821	5,783	8,355	4,747	5,696	8,246	4,571	4,135	6,409	4,496	5,052	6,317
West North Central:														
Minnesota	2,982	3,375	4,070	4,821	6,878	4,066	4,875	7,054	3,852	4,264	5,243	3,845	4,314	5,387
Iowa	2,621	2,822	3,178	3,608	4,934	3,256	3,790	5,321	3,014	3,188	3,744	3,091	3,360	4,065
Missouri	3,955	4,271	4,837	5,549	7,667	4,923	5,734	8,057	4,589	4,910	5,836	4,672	5,083	6,155
North Dakota	620	650	700	752	973	756	882	1,240	658	651	716	713	776	938
South Dakota	653	699	780	876	1,184	823	972	1,384	734	765	885	777	857	1,051
Nebraska	1,326	1,457	1,675	1,897	2,588	1,689	1,970	2,772	1,589	1,675	1,962	1,602	1,745	2,116
Kansas	1,905	2,116	2,476	2,894	4,074	2,519	2,998	4,305	2,341	2,554	3,095	2,382	2,652	3,285

See footnotes at end of table, p. 29.

TABLE 2.—*Illustrative projections of the total population of States, 1970, 1980, and 2000, with comparative estimates for July 1, 1958*—Continued

[Figures in thousands. Figures relate to the total population residing in each State, i.e., the civilian population plus Armed Forces stationed in the State. Each population estimate has been independently rounded to the nearest thousand from figures computed to hundreds; hence, the sums of parts shown may differ slightly from the totals shown]

State	Apr. 1, 1950 (census)	July 1, 1958 [1]	Series II-1			Series II-2			Series IV-1			Series IV-2		
			1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
South Atlantic:														
Delaware	318	454	690	908	1,431	610	784	1,215	656	813	1,115	577	699	940
Maryland	2,343	2,956	4,027	5,188	8,017	3,847	4,851	7,372	3,824	4,641	6,223	3,646	4,323	5,694
District of Columbia	802	825	866	1,007	1,406	975	1,157	1,654	813	882	1,057	921	1,022	1,260
Virginia	3,319	3,735	4,939	6,090	9,007	4,903	6,011	8,879	4,679	5,416	6,926	4,642	5,337	6,818
West Virginia	2,006	1,969	1,938	2,048	2,595	2,228	2,551	3,521	1,823	1,775	1,908	2,112	2,254	2,672
North Carolina	4,062	4,549	5,336	6,258	8,803	5,520	6,641	9,627	5,036	5,810	6,661	5,216	5,872	7,346
South Carolina	2,117	2,404	2,835	3,316	4,652	2,952	3,586	5,249	2,662	2,988	3,485	2,777	3,154	3,963
Georgia	3,445	3,818	4,450	5,201	7,291	4,656	5,630	8,203	4,181	4,549	5,470	4,383	4,957	6,229
Florida	2,771	4,442	7,280	9,852	15,960	6,200	8,142	12,886	6,943	8,881	12,552	5,891	7,297	10,043
East South Central:														
Kentucky	2,945	3,080	3,335	3,674	4,874	3,571	4,168	5,872	3,141	3,203	3,624	3,375	3,675	4,454
Tennessee	3,292	3,469	3,808	4,375	6,052	4,104	4,856	6,933	3,591	3,842	4,563	3,884	4,256	5,289
Alabama	3,062	3,211	3,502	3,933	5,318	3,820	4,539	6,507	3,284	3,416	3,943	3,599	3,992	4,930
Mississippi	2,175	2,186	2,218	3,224	2,931	2,551	2,990	4,229	2,061	1,973	2,097	2,303	2,610	3,170
West South Central:														
Arkansas	1,910	1,766	1,541	1,437	1,605	1,962	2,213	3,007	1,427	1,192	1,097	1,847	1,932	2,246
Louisiana	2,684	3,110	3,831	4,659	6,781	3,911	4,838	7,212	3,595	4,086	5,117	3,672	4,253	5,476
Oklahoma	2,233	2,285	2,396	2,508	3,141	2,559	2,910	3,989	2,263	2,179	2,312	2,424	2,566	3,020
Texas	7,711	9,377	12,167	15,176	22,658	11,926	14,826	22,216	11,493	13,461	17,372	11,255	13,129	17,022
Mountain:														
Montana	591	688	852	1,023	1,477	837	1,012	1,475	806	906	1,127	790	894	1,125
Idaho	589	662	780	931	1,335	810	981	1,431	736	821	1,015	765	867	1,092
Wyoming	291	320	370	441	632	391	473	690	349	389	479	369	418	527
Colorado	1,325	1,711	2,347	2,958	4,482	2,179	2,709	4,059	2,230	2,643	3,471	2,065	2,412	3,130
New Mexico	681	842	1,117	1,455	2,278	1,144	1,493	2,348	1,041	1,275	1,730	1,068	1,309	1,783
Arizona	750	1,140	1,834	2,537	4,218	1,649	2,222	3,607	1,732	2,266	3,286	1,553	1,975	2,790
Utah	689	865	1,166	1,498	2,313	1,146	1,466	2,260	1,097	1,325	1,775	1,077	1,295	1,729
Nevada	160	267	450	616	1,015	382	508	815	428	535	797	362	455	635
Pacific:														
Washington	2,379	2,769	3,470	4,427	6,803	3,535	4,401	6,610	3,295	3,959	5,285	3,357	3,926	5,110
Oregon	1,521	1,773	2,177	2,783	4,284	2,249	2,783	4,156	2,077	2,501	3,346	2,145	2,495	3,229
California	10,586	14,337	20,694	27,838	45,110	19,601	25,433	39,811	19,695	25,039	35,363	18,622	22,771	30,986
Alaska	129	191	272	384	659	263	397	672	252	339	507	263	349	517
Hawaii	500	632	811	1,004	1,496	809	1,009	1,514	766	893	1,155	763	897	1,170

[1] Provisional estimates. Revised estimates have been published in Bureau of the Census, Current Population Reports, Series P-25, No. 208.

[2] Relates to 50 States and the District of Columbia in all years.

The population projections were prepared by a combination of the component method, which makes separate allowances for the components of population change (i.e., births, deaths, and net migration), and the ratio method, which is based on assumptions concerning the percentage redistribution of population among the States. The component procedure was used to develop the projections to the year 1980 and the ratio method was used for the following period. The Roman numeral in the series notation identifies the series of national population projections (II or IV) used as control totals. These national figures correspond to the series II and IV projections for the United States shown in table 1 except that they exclude Armed Forces abroad.

The second element in the series notation for the State projections identifies the assumptions on interstate migration that were used (1 or 2). Thus, for example, the notation series II–2 indicates that the series was tied in with the series II national population projections and with assumption 2 concerning future interstate migration. The two assumptions employed regarding interstate migration to 1980 are as follows:

1. The average annual amount of migration of the period 1950–58 is assumed to prevail to 1970 and then the average annual amount of migration of the 1940–58 period is assumed to prevail for the period 1970–80.

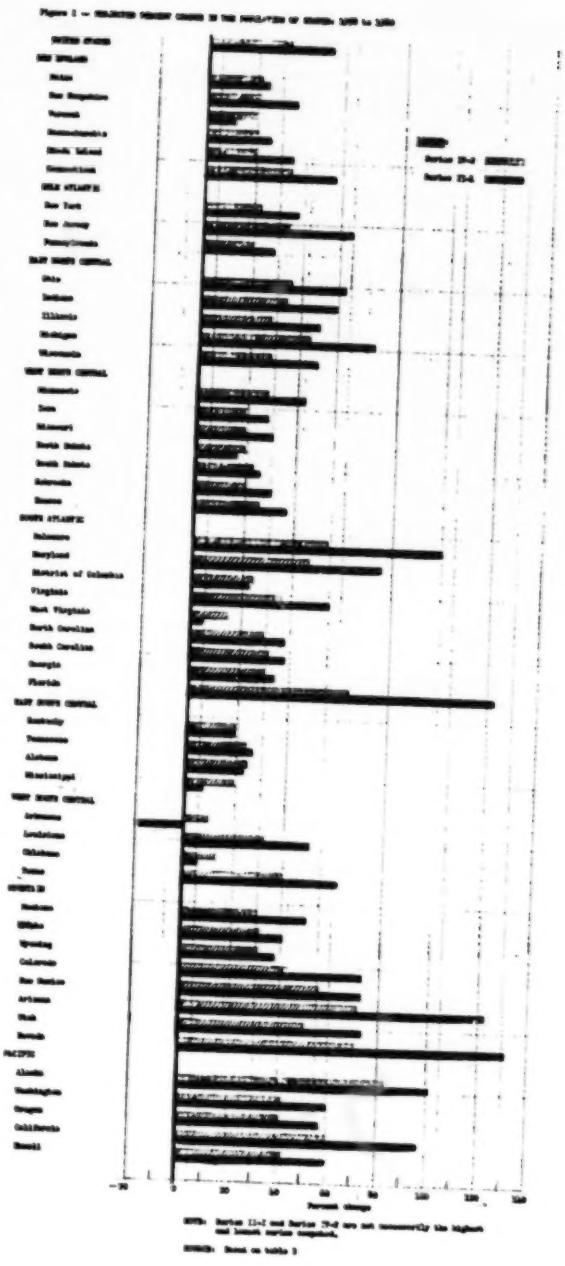
2. Average annual amount of migration during the period 1958 to 1980 is assumed to equal one-half that of the 1940–58 period.

Projections of births and deaths were derived by projecting the crude birth and death rates of each State to the year 1980 on the assumption that State and National rates would wholly (death rates) or partly (birth rates) converge by the year 2000.

After 1980, as noted, a ratio method was used to extend the projections to the year 2000. Specifically, it was assumed that the change in the proportion of population in each State between 1980 and 2000 would be the same as the change in the proportion that occurred between 1970 and 1980, as implied by the projections for these dates.

According to the projections, the rapid growth of the national population between 1960 and 1980 would be shared by all sections of the country and by most States. Rates of growth greater than that for the United States as a whole are assumed for the South Atlantic, the Mountain, and the Pacific divisions. With favorable fertility and migration rates, the Pacific division may increase by more than 80 percent in the next 20 years. The East North Central and the West South Central divisions would grow at roughly the same rate as the United States, and the other parts of the country at a slower rate.

According to the projections, a few States, such as Vermont, West Virginia, Arkansas, and Oklahoma, may actually lose population if fertility is low and interstate migration is high, but none would lose if fertility is high and interstate migration is low. If both fertility and interstate migration are high, States such as California, Delaware, Florida, Arizona, and Nevada may double in population in the next 20 years. California may well be the largest State by 1980, with 23 to 28 million. New York would be second, with 20 to 22 million. Pennsylvania, Texas, Ohio, Illinois, and Michigan may each have from 11 to 15 million. Florida and New Jersey, although both are fast-growing States, are still not expected to reach 10 million by 1980. The percent of increase for States from 1958 to 1980, according to two of the four series of projections (II–1 and IV–2), is graphically depicted in figure 2. It should be borne in mind that the projections for States to 1980 are all quite speculative; and that the projections for the year 2000 are of the nature of a mathematical exercise.



PROJECTIONS FOR SELECTED RIVER BASINS

Table 3 shows estimates and projections for the eight river basins indicated on the map (plate II) which appears in the front of this report for the years 1958 to 2000. Specifically, the table shows

estimates for July 1, 1958, and four series of projections for 1970, 1980, and 2000, for the following river basins: The basin of the Arkansas, White, and Red Rivers; the basin of the Colorado River; the lower Mississippi; the basin of the Ohio River (but excluding the Tennessee and the Cumberland); the basin of the Missouri River (including the Red River of the North); the Pacific Northwest (including the Columbia and the Puget Sound areas); the basin of the upper Rio Grande (including the Pecos); and the basin of the Potomac. The first six of the eight basins listed are defined, with the minor exceptions noted below, as in the Bureau of the Census report, U.S. Census of Manufactures, 1954, Industrial Water Use, Bulletin MC–209. The last two were specifically defined for this study. The map shows the geographic definitions of the river basins included in this report. Not included in this report are the New England region, the Delaware and the Hudson Basins, the remainder of the Chesapeake Bay region, the Southeast region, the Great Lakes and St. Lawrence regions, the upper Mississippi Basin, the remainder of the Western Gulf region, the Great Basin region, and the California region. The regions for which projections were prepared contained an estimated 28 percent of the total resident population of the United States in 1958.

TABLE 3.—*Illustrative projections of the population of selected river basins, 1970, 1980, and 2000, with comparative estimates for July 1, 1958*

[Figures in thousands. Figures relate to the total population residing in each area, i.e., the civilian population plus Armed Forces stationed in the area. With the exceptions noted below, the geographic definitions of the river basins conform to those given in: U.S. Bureau of the Census, U.S. Census of Manufactures: 1954, subject Bulletin MC-209, Industrial Water Use, 1957. See map for further information]

Year and series	Arkansas-White-Red	Colorado [1]	Lower Mississippi [2]	Missouri [3]	Ohio [3 4]	Pacific Northwest [5]	Potomac [6]	Upper Rio Grande [7]
Apr. 1, 1950 (census)	7,076	1,112	4,160	7,543	16,188	4,677	2,369	987
July 1, 1958 [8]	7,286	1,634	4,605	8,262	17,559	5,425	2,898	1,290
PROJECTIONS								
Series II–1:								
1970	7,967	2,574	5,294	9,582	20,332	6,702	3,770	1,800
1980	8,930	3,576	6,110	11,074	23,884	8,496	4,873	2,416
2000	11,194	6,302	8,687	15,290	33,289	13,064	7,977	4,114
Series II–2:								
1970	8,074	2,436	5,091	9,651	20,519	6,841	3,828	1,756
1980	9,196	3,339	6,871	11,340	24,211	8,507	4,954	2,348
2000	11,727	5,813	10,214	15,933	33,925	12,850	8,129	4,003
Series IV–1:								
1970	7,517	2,431	4,977	9,076	19,258	6,366	3,568	1,700
1980	7,873	3,181	5,330	9,792	21,168	7,590	4,322	2,144
2000	8,504	4,868	6,492	11,639	25,467	10,126	6,114	3,156
Series IV–2:								
1970	7,623	2,296	5,370	9,142	19,438	6,497	3,626	1,657
1980	8,127	2,959	6,054	10,044	21,470	7,588	4,398	2,079
2000	8,949	4,469	7,750	12,174	25,979	9,922	6,239	3,068

[1] Excludes Imperial County, Calif.

[2] Carlisle, Fulton, Graves, and Hickman Counties, Ky., are included in the Ohio River Basin rather than the lower Mississippi Basin.

[3] Includes Grant and Roberts Counties, S. Dak.; includes the basin of the Red River of the North.

[4] Excludes Alleghany, Ashe, and Watauga Counties, N.C., and the Cumberland and Tennessee water use regions.

[5] Includes Bear Lake, Franklin, and Oneida Counties, Idaho, and Harney Lake, and Klamath Counties, Oreg.; includes the Columbia and Puget Sound areas.

[6] Defined specially as in the Potomac River Basin economic survey being conducted by the Office of Business Economics, Department of Commerce.

[7] Upper Rio Grande only, including the Pecos River Basin.

[8] Provisional estimates.

The figures shown in table 3 are consistent with the estimates for States in 1958 and the four series of projections for States for 1970, 1980, and 2000 shown in table 2. The population projections for river basins were developed by a ratio method, using assumptions concerning the change in the percentage which the population of each river basin constituted of the total population of the States containing it. Specifically, it was assumed that the change between 1958 and 1970 in the proportion residing in each river basin area, of the combined population of the States within which each basin is located, would be the same as the change in the proportion between 1950 and 1958. Then, it was assumed that the change in the proportion between 1970 and 2000 would be the same

as had occurred between 1940 and 1958. The proportion of population in each basin for 1980 was obtained by interpolation between the proportions for 1970 and 2000 obtained as just described.

The projected proportions so obtained were applied to the projections of State population described in the previous section of this report. Thus, four series of projections for the river basins were obtained, using the four series of State projections. The series notation used (II–1, II–2, IV–1, and IV–2) is the same as that used for the State projections and indicates which series of projections for States was used to prepare each series of projections for a river basin.

To simplify the computations, certain segments of States were arbitrarily transferred to another region than the one to which they were assigned in the report on "Industrial Water Use." These transfers are shown in table 4. The transfers are so small that they may be ignored in any analysis of the data.

TABLE 4.—*Special modifications in boundaries of selected river basins*

Counties transferred	State	River Basin		Transferred population	
		Initial area	New area	1950 population	Percent of basin population under study
1. Imperial	California	Colorado [1]	California	62,975	5.66
2. Grant, Roberts	South Dakota	Upper Mississippi	Missouri [1]	25,162	.33
3. Bear Lake, Franklin	Idaho	Great Basin	Pacific Northwest [1]	21,088	.45
4. Alleghany, Ashe, Watauga	North Carolina	Ohio [1]	Southeast	48,375	.30
5. Carlisle, Fulton, Graves, Hickman	Kentucky	Lower Mississippi [1]	Ohio [1]	59,016	[2] 1.42 / [3] .36
6. Harney, Lake	Oregon	Great Basin	Pacific Northwest [1]	12,792	.27
7. Klamath	Oregon	California	do.	140	.90

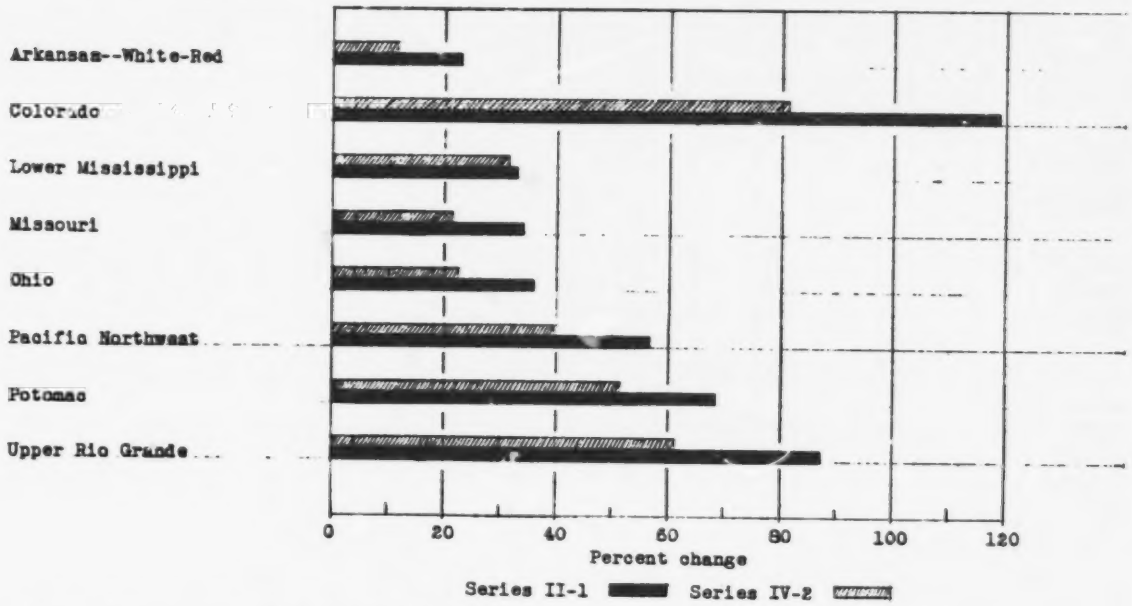
[1] River basin included in this study. [2] Lower Mississippi. [3] Ohio.

Projection of past trends suggests that the population of the Colorado Basin, the upper Rio Grande Basin, and the Potomac Basin will grow more rapidly than the population of the United States as a whole, and that the population of the other river basins included in the report will increase more slowly. According to the projections, the population of all eight basins combined would drop from about 28.2 percent of the total population in 1958 to between 26.7 percent and 27.3 percent in 1980. The projections indicate that the basin of the Arkansas, White, and Red Rivers may be headed for a rather slow growth. It may increase between 8 and 23 percent in this 22-year period, or between 600,000 and 1.9 million. The Colorado, on the other hand, may increase between 80 and 120 percent, or by 1.3 to 1.6 million. The largest absolute increase would occur in the Ohio Basin, a matter of 3.6 to 6.7 million in the 1958–80 period. The percentage increase for the river basins from 1958 to 1980, according to two of the four series (II–1 and IV–2), is shown in figure 3.

PROJECTIONS FOR URBAN POPULATION OF STATES

Table 5 shows four series of projections for the urban population of States for the years 1970, 1980, and 2000. These projections are consistent with the figures for the total population of States shown in table 2.

Figure 3.--PROJECTED PERCENT CHANGE IN THE POPULATION OF SELECTED RIVER BASINS: 1958 TO 1980



Note: Series II-1 and Series IV-2 are not necessarily the highest and lowest series computed.
Source: Based on table 3.

TABLE 5.—*Illustrative projections of the urban population of States, 1970, 1980, and 2000, with comparative figures for Apr. 1, 1950*

Figures in thousands. Figures relate to the total population residing in each area; i.e., the civilian population plus Armed Forces stationed in the area. Figures reflect the new definition of urban population adopted in connection with the 1950 Census of Population. Each population estimate has been independently rounded to the nearest thousand from figures computed to hundreds; hence, the sums of parts shown may differ slightly from the totals shown]

State	Apr. 1, 1950 (census)	Series II-1			Series II-2			Series IV-1			Series IV-2		
		1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
United States [1]	96,847	147,270	186,013	291,079	143,209	176,649	266,596	139,475	165,095	223,373	135,628	156,783	204,587
Regions:													
Northeast	31,373	40,044	47,946	70,291	39,650	46,471	65,820	38,011	42,671	53,857	37,653	41,286	50,474
North Central	28,491	42,595	53,243	82,388	41,170	50,325	75,183	40,335	47,229	63,155	38,969	44,621	57,6[illegible]
The South	22,956	38,105	48,923	78,571	37,492	47,798	75,423	35,951	43,180	59,745	35,404	42,274	57,638
The West	14,027	26,526	35,901	59,829	24,897	32,055	50,170	25,178	32,145	46,616	23,602	28,602	38,874
Geographic divisions:													
New England	7,102	8,673	10,345	15,117	8,807	10,335	14,669	8,207	9,147	11,824	8,348	9,162	11,221
Middle Atlantic	24,272	31,371	37,601	55,174	30,843	36,136	51,151	29,804	33,424	42,333	29,305	32,124	39,253
East North Central	21,196	31,936	40,123	62,046	30,585	37,310	55,277	30,244	35,651	47,722	28,943	33,101	42,415
West North Central	7,305	10,659	13,120	20,342	10,585	13,015	19,906	10,091	11,578	15,433	10,026	11,520	15,186
South Atlantic	10,391	18,207	23,719	38,541	17,359	22,131	34,539	17,229	21,051	29,562	16,421	19,639	26,755
East South Central	4,488	6,050	7,304	11,211	6,443	8,058	12,361	5,677	6,343	8,313	6,077	7,090	9,593
West South Central	8,080	13,848	17,900	28,819	13,690	17,607	27,923	13,045	15,756	21,850	12,906	15,545	21,290
Mountain	2,786	5,609	7,631	12,965	5,240	6,916	11,272	5,293	6,772	9,995	4,938	6,122	8,649
Pacific	11,241	20,917	28,270	46,844	19,657	25,139	38,898	19,885	25,373	[illegible],621	18,664	22,480	30,225

[1] Relates to 50 States and the District of Columbia in all years.

TABLE 5.—*Illustrative projections of the urban population of States, 1970, 1980, and 2000, with comparative figures for Apr. 1, 1950*—Continued

[Figures in thousands. Figures relate to the total population residing in each area; i.e., the civilian population plus Armed Forces stationed in the area. Figures reflect the new definition of urban population adopted in connection with the 1950 Census of Population. Each population estimate has been independently rounded to the nearest thousand from figures computed to hundreds; hence, the sums of parts shown may differ slightly from the totals shown]

State	Apr. 1, 1950 (census)	Series II–1			Series II–2			Series IV–1			Series IV–2		
		1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
New England:													
Maine	472	538	626	890	565	660	932	507	548	670	534	583	709
New Hampshire	307	402	483	717	394	463	666	382	429	549	374	411	510
Vermont	138	149	175	260	169	203	306	139	152	192	159	179	232
Massachusetts	3,959	4,467	5,217	7,446	4,656	5,394	7,539	4,219	4,596	5,644	4,412	4,775	5,753
Rhode Island	667	853	1,007	1,449	836	965	1,344	812	896	1,113	795	859	1,032
Connecticut	1,559	2,264	2,837	4,355	2,187	2,650	3,882	2,148	2,526	3,356	2,074	2,355	2,985
Middle Atlantic:													
New York	12,682	16,126	19,258	28,098	15,881	18,494	25,976	15,336	17,139	21,585	15,101	16,452	19,943
New Jersey	4,186	6,389	7,992	12,209	5,992	7,217	10,480	6,081	7,144	9,455	5,695	6,434	8,085
Pennsylvania	7,403	8,856	10,351	14,867	8,970	10,425	14,695	8,387	9,141	11,293	8,509	9,238	11,225
East North Central:													
Ohio	5,578	8,456	10,673	16,557	8,113	9,931	14,744	8,002	9,480	12,735	7,672	8,807	11,311
Indiana	2,357	3,538	4,464	6,959	3,415	4,184	6,249	3,350	3,966	5,350	3,232	3,711	4,794
Illinois	6,759	9,472	11,589	17,392	9,114	10,865	15,680	8,983	10,296	13,353	8,638	9,642	12,019
Michigan	4,503	7,534	9,756	15,524	7,118	8,901	13,495	7,127	8,680	11,983	6,727	7,901	10,380
Wisconsin	1,988	2,936	3,641	5,614	2,825	3,429	5,109	2,782	3,229	4,301	2,674	3,040	3,911
West North Central:													
Minnesota	1,625	2,486	3,115	4,905	2,427	3,012	4,639	2,352	2,752	3,735	2,294	2,664	3,541
Iowa	1,251	1,735	2,101	3,217	1,737	2,110	3,199	1,644	1,855	2,439	1,649	1,870	2,443
Missouri	2,433	3,386	4,117	6,258	3,367	4,067	6,064	3,211	3,639	4,758	3,195	3,604	4,630
North Dakota	165	259	315	498	273	354	586	243	273	366	258	311	442
South Dakota	214	340	426	685	351	452	738	320	372	512	331	399	560
Nebraska	622	962	1,184	1,848	948	1,176	1,825	912	1,045	1,399	898	1,041	1,393
Kansas	993	1,491	1,862	2,931	1,482	1,844	2,855	1,409	1,642	2,224	1,401	1,631	2,177
South Atlantic:													
Delaware	199	443	596	983	383	491	770	421	533	765	361	439	595
Maryland	1,616	2,825	3,707	5,955	2,636	3,314	5,050	2,681	3,312	4,618	2,498	2,951	3,899
District of Columbia	802	866	1,007	1,406	975	1,157	1,654	813	882	1,057	921	1,022	1,260
Virginia	1,560	2,687	3,547	5,901	2,606	3,348	5,363	2,544	3,151	4,532	2,467	2,970	4,117
West Virginia	694	794	908	1,321	892	1,082	1,652	747	786	970	845	956	1,253
North Carolina	1,368	2,085	2,627	4,205	2,106	2,667	4,240	1,966	2,311	3,178	1,990	2,356	3,234
South Carolina	778	1,228	1,553	2,492	1,249	1,606	2,503	1,153	1,356	1,865	1,175	1,411	1,967
Georgia	1,559	2,399	3,028	4,829	2,452	3,134	5,010	2,253	2,645	3,619	2,308	2,758	3,803
Florida	1,814	4,880	6,746	11,449	4,060	5,332	8,507	4,651	6,075	8,978	3,856	4,776	6,627
East South Central:													
Kentucky	1,084	1,431	1,696	2,561	1,497	1,840	2,845	1,347	1,477	1,903	1,414	1,622	2,158
Tennessee	1,453	1,869	2,270	3,476	1,967	2,409	3,673	1,760	1,990	2,618	1,861	2,129	2,800
Alabama	1,341	1,913	2,351	3,668	2,040	2,594	4,139	1,793	2,039	2,716	1,921	2,280	3,134
Mississippi	607	837	987	1,506	939	1,215	2,004	777	837	1,076	881	1,059	1,501
West South Central:													
Arkansas	631	694	727	975	863	1,071	1,684	642	603	666	812	935	1,258
Louisiana	1,472	2,466	3,213	5,232	2,460	3,191	5,131	2,313	2,815	3,944	2,309	2,804	3,894
Oklahoma	1,139	1,523	1,734	2,471	1,589	1,923	2,893	1,437	1,505	1,816	1,504	1,696	2,189
Texas	4,838	9,165	12,226	20,141	8,778	11,424	18,215	8,653	10,833	15,424	8,281	10,110	13,949
Mountain:													
Montana	258	442	574	944	425	543	869	418	507	720	401	480	663
Idaho	253	409	532	877	415	536	867	385	468	666	392	473	661
Wyoming	147	234	304	499	241	312	502	220	268	377	228	276	383
Colorado	831	1,626	2,152	3,554	1,475	18,85	2,967	1,543	1,922	2,749	1,397	1,677	2,287
New Mexico	342	705	1,002	1,789	705	983	1,700	657	876	1,357	658	861	1,291
Arizona	416	1,051	1,491	2,611	923	1,249	2,059	992	1,330	2,032	868	1,109	1,592
Utah	450	830	1,116	1,863	797	1,044	1,679	781	986	1,428	749	921	1,283
Nevada	92	312	460	849	259	364	629	297	415	666	245	325	489
Pacific:													
Washington	1,503	2,201	2,844	4,496	2,191	2,703	4,028	2,088	2,540	3,489	2,080	2,410	3,112
Oregon	819	1,219	1,604	2,616	1,231	1,534	2,340	1,163	1,440	2,040	1,173	1,374	1,817
California	8,539	16,778	422,864	38,138	15,530	19,978	31,041	15,967	20,542	29,862	14,748	17,876	24,146
Alaska	34	85	130	256	86	128	240	78	115	197	80	113	185
Hawaii	345	634	828	1,338	619	796	1,249	599	736	1,033	583	707	965

These population projections were developed essentially by a ratio method, using assumptions concerning the percentage change in the proportion which the urban population of each State will constitute of the total population of the State. In developing the assumptions, principal attention was given to changes in State proportions between 1940 and 1950 (both figures being based on the old definition of the urban population), although these changes were modified in a number of States. In the case of several States which had low urban proportions in 1950 and very large increases in these proportions between 1940 and 1950, the projected 10-year increases in the urban proportions based on 1940–50 changes were reduced somewhat. In the case of those States which experienced decreases in the urban proportions between 1940 and 1950 (resulting in part from actual changes and in part from the relative inflexibility of the definition of the urban population applied on a comparable basis in 1940 and 1950), small increases were initially assumed instead. The assumed percent changes in urban proportions after 1950 were applied to the urban proportions in each State in 1950 based on the new definition of the urban population.

The single series of projected proportions so obtained were applied to the four series of projections of the total population of States previously developed, to arrive at four tentative series of projections for the urban population of States. These figures were then adjusted to add to four series of independent projections of the total urban population of the United States which were based on observed changes in the national proportion of urban population since 1940. Thus, the initial assumptions regarding the changes in the urban proportions by States were, in effect, modified by the adjustment to the independent national totals for the urban population.

Two series of assumptions regarding the national proportion urban in future years were made: In the first, the proportion is assumed to rise approximately from 64 percent in 1950 to 66 percent in 1960 and 70 percent in the year 2000; in the other, the proportion is assumed to rise to 76 percent in the year 2000. These two proportions were combined with two of the four series of total U.S. population figures (II and IV), to arrive at four series of national urban figures.

As a result of the change in the definition of the urban population made at the time of the 1950 census, only one observation exists (1950) on the proportion urban in each State according to the new definition and, hence, a satisfactory basis does not exist for extrapolating the State proportions. Later information on the urban population of States is not available. Furthermore, the present size of the urban population of the United States cannot be stated very closely. The available information, based on the Census Bureau's Current Population Survey, gives for 1959 the urban population residing in areas defined as urban according to the 1950 census (Current Population Reports, Series P–20, No. 98). Hence, it does not allow for any reclassification of areas as urban or rural which would be revealed by a census taken at the present time. As a result, the urban population of the United States is understated in the reported data and an arbitrary adjustment had to be made in the figure before it could be used for projection purposes. Furthermore, the national urban proportions for the year 2000 represent relatively arbitrary extensions of the estimated present levels. Finally, a number of alternative assumptions, resulting in a wider range of projections, could have been used, and many other series of projections could have been developed corresponding to a particular series of projections of total State population. In view, therefore, of our relative lack of information relating to changes since 1950 and the arbitrariness of the assumptions with reference to postcensal and future years, the projections of urban population have a very weak foundation and should be considered as extremely crude illustrations of possible future changes. The reservations expressed earlier with respect to population projections for States and other geographic units within the United States apply with particular force to projections of the urban population of States.

The notation used to identify the various series of projections of urban population (II–1, II–2, IV–1, IV–2) is the same as that used to identify the various series of projections of total State population and indicates which series of projections for States was used to prepare each series of urban projections.

PROJECTIONS FOR SELECTED STANDARD METROPOLITAN STATISTICAL AREAS

Table 6 shows estimates and projections for several "standard metropolitan statistical areas" for the years 1958, 1970, 1980, and 2000. Four series of projections are shown for each future date. Figures are given for the following areas: The Albuquerque, Boston, Dallas, Fort Worth, Houston, Kansas City, Los Angeles-Long Beach, Philadelphia, Phoenix, San Francisco-Oakland, and Washington, D.C., standard metropolitan statistical areas; and the New York standard consolidated area. The areas are defined in terms of geographic boundaries established by the Bureau of the Budget with the advice of the Federal Committee on Standard Metropolitan Statistical Areas (U.S. Bureau of the Budget, "Standard Metropolitan Statistical Areas," 1959). Each area consists of one or more counties (except in New England) that are economically integrated around a central city or cities. The definitions of the areas in terms of component counties are given in table 7 and the locations are shown on the map which appears in the front of this report. (Plate II)

TABLE 6.—*Illustrative projections of the population of selected standard metropolitan statistical areas, 1970, 1980, and 2000, with comparative estimates for July 1, 1958*

[Figures in thousands. Figures relate to the total population residing in each area, i.e., the civilian population plus Armed Forces stationed in the area. Definitions of areas are given in table and are shown on the map which appears at the front of Part II.]

Standard metropolitan statistical area	Apr. 1, 1950 (census)	July 1, 1958 [1]	Series II-1			Series II-2			Series IV-1			Series IV-2		
			1970	1980	2000	1970	1980	2000	1970	1980	2000	1970	1980	2000
Albuquerque, N. Mex.	146	216	326	502	1,377	352	607	1,420	320	518	1,046	329	532	1,078
Boston, Mass.	2,398	2,487	2,705	3,128	4,362	2,885	3,382	4,789	2,556	2,759	3,310	2,735	2,995	3,657
Dallas, Tex.	744	997	1,427	1,954	3,437	1,398	1,909	3,371	1,348	1,733	2,635	1,320	1,690	2,563
Fort Worth, Tex.	393	580	915	1,351	2,643	897	1,320	2,592	864	1,198	2,026	846	1,169	1,986
Houston, Tex.	807	1,155	1,764	2,562	4,907	1,729	2,504	4,812	1,666	2,272	3,762	1,632	2,217	3,687
Kansas City, Mo.	814	996	1,288	1,639	2,701	1,311	1,694	2,845	1,220	1,448	2,055	1,242	1,500	2,173
Los Angeles-Long Beach, Calif.	4,368	6,209	9,406	12,762	21,031	8,911	11,661	18,563	8,952	11,478	16,487	8,466	10,440	14,449
New York-Northeastern New Jersey [2]	12,912	14,271	16,838	20,023	28,480	16,733	19,749	27,928	16,026	17,863	21,959	15,915	17,589	21,483
Philadelphia, Pa.	3,671	4,238	5,186	6,328	9,695	5,308	6,540	10,131	4,919	5,607	7,399	5,039	5,504	7,755
Phoenix, Ariz.	332	539	924	1,392	2,693	831	1,220	2,303	873	1,244	2,098	783	1,084	1,781
San Francisco-Oakland, Calif.	2,241	2,633	3,298	4,242	6,241	3,125	3,876	5,508	3,139	3,815	4,892	2,969	3,470	4,287
Washington, D.C.	1,464	1,911	2,785	4,477	9,835	2,836	4,472	9,624	2,633	3,979	7,576	2,684	3,972	7,401

[1] Provisional estimates.

[2] Standard Consolidated Area.

TABLE 7.—*Definitions of selected standard metropolitan statistical areas*

Standard metropolitan statistical area	Component areas
Albuquerque, N. Mex.	Bernalillo County.
Boston, Mass.	Suffolk County (complete).
	Middlesex County (part): Cambridge, Everett, Malden, Medford, Melrose, Newton, Somerville, Waltham, and Woburn Cities; Arlington, Ashland, Bedford, Belmont, Burlington, Concord, Framingham, Lexington, Lincoln, Natick, North Reading, Reading, Stoneham, Sudbury, Wakefield, Watertown, Wayland, Weston, Wilmington, and Winchester towns.
	Essex County (part): Beverly, Lynn, Peabody, and Salem cities; Danvers, Hamilton, Lynnfield, Manchester, Marblehead, Middleton, Nahant, Saugus, Swampscott, Topsfield, and Wenham towns.
	Norfolk County (part): Quincy City; Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Holbrook, Medfield, Milton, Needham, Norfolk, Norwood, Randolph, Sharon, Walpole, Wellesley, Westwood, and Weymouth towns.
	Plymouth County (part): Duxbury, Hanover, Hingham, Hull, Marshfield, Norwell, Pembroke, Rockland, and Scituate towns.
Dallas, Tex.	Collin County, Dallas County, Denton County, and Ellis County.
Fort Worth, Tex.	Johnson County, Tarrant County.
Houston, Tex.	Harris County.
Kansas City, Mo.	Clay County and Jackson County, Mo.
	Johnson County and Wyandotte County, Kans.
Los Angeles-Long Beach, Calif.	Los Angeles County, Orange County.
New York-northeastern New Jersey.[1]	New York City; Nassau County, Rockland County, Suffolk County, and Westchester County, N.Y.
	Bergen County, Essex County, Hudson County, Middlesex County, Morris County, Passaic County, Somerset County, and Union County, N.J.
Philadelphia, Pa.	Bucks County, Chester County, Delaware County, Montgomery County, and Philadelphia County, Pa.
	Burlington County, Camden County, and Gloucester County, N.J.
Phoenix, Ariz.	Maricopa County.
San Francisco-Oakland, Calif.	Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, and Solano County.
Washington, D.C.	District of Columbia.
	Montgomery County and Prince Georges County, Md.
	Alexandria and Falls Church cities; Arlington County and Fairfax County, Va.

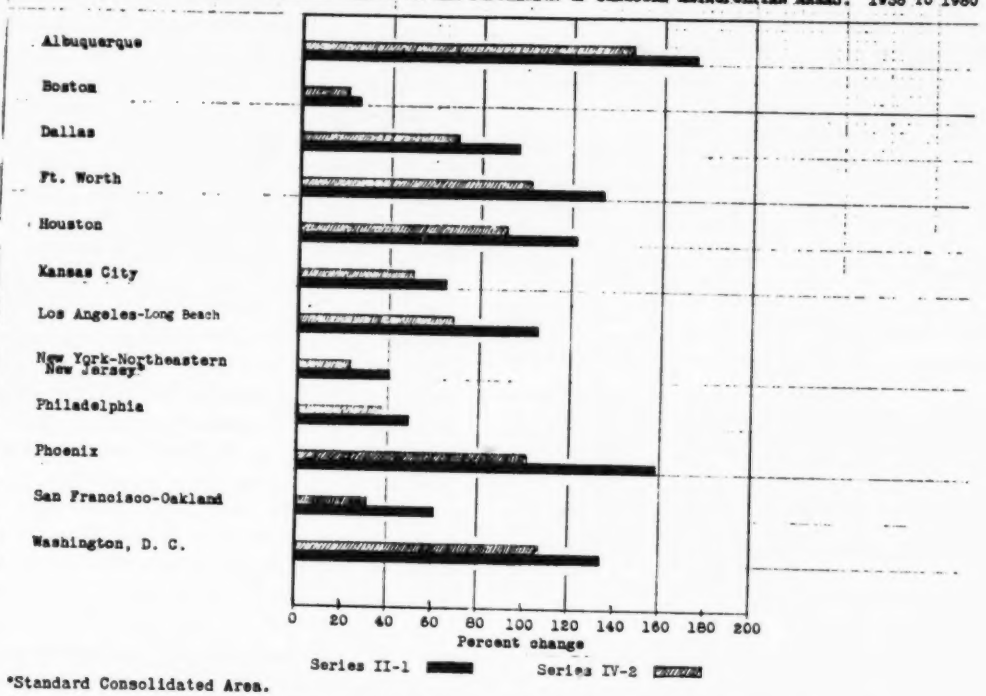
[1] Standard Consolidated Area.

Source: U.S. Bureau of the Budget, "Standard Metropolitan Statistical Areas," 1959.

The population projections were developed by a ratio method, using assumptions concerning the changes in the percentage which the population of the metropolitan area constituted of the total population of the State or States containing it. Specifically, it was assumed that the change between 1958 and 1970 in the proportion residing in the metropolitan area, of the total population of the State or States within which the area is located, would be the same as the change in the proportion between 1950 and 1958. Then, it was assumed that the change in the proportion between 1970 and 2000 would be the same as had occurred between 1940 and 1958. The proportion of population in the metropolitan area for 1980 was obtained by interpolation between the proportions for 1970 and 2000 obtained as just described. The projected ratios so obtained were applied to the projections of State total population previously developed. Four series of projections for the metropolitan areas were obtained, using the four series of State projections. The series notation used (II–1, II–2, IV–1, IV–2) refers to the series of projections for States used to prepare each series of projections for the metropolitan areas.

Projections of population of metropolitan areas must be considered more tentative than the projections for States and river basins. Migration to and from metropolitan areas is influenced by local factors and is more unstable than interstate or interregional migration. On the basis of past trends of growth, however, comparatively rapid growth would be indicated for the Albuquerque, Dallas, Fort Worth, Houston, Los Angeles-Long Beach, Phoenix, and Washington, D.C., standard metropolitan statistical areas, and comparatively slow growth for the Boston, New York-northeastern New Jersey, Philadelphia, and San Francisco-Oakland areas. The Kansas City area would have moderate growth. The percentage increase of population for these areas from 1958 to 1980, according to two of the four series (II–1 and IV–2), is shown in figure 4.

Figure 4.--PROJECTED PERCENT CHANGE IN THE POPULATION OF SELECTED METROPOLITAN AREAS: 1958 TO 1980



*Standard Consolidated Area.

Note: Series II-I and Series IV-2 are not necessarily the highest and lowest series computed.

Source: Based on table 5.

CONCLUDING NOTE

For the most part, the estimates and projections included in this report were prepared expressly at the request of the Senate Select Committee on National Water Resources for its use in connection with its special study on the Nation's water resources. As suggested earlier, in view of the kinds of data requested by the committee and the terms of its request, the Bureau of the Census was required to develop data which represented a deviation from its policy with regard to the quality and kinds of data which it should prepare and publish. Accordingly, most of the data provided in this report are to be considered unofficial. This reservation applies specifically to the projections of the total population of the United States after 1980, the projections of the urban population of the United States, the projections of the total and urban population of States, and the current estimates and projections for river basins and metropolitan areas.

The projections included in this report are based on specific assumptions, apart from which the figures have little meaning. A proper interpretation of the figures requires that account be taken of the specific assumptions on which they were based.

PART III. NOTES ON POPULATION PROJECTIONS FOR THE SENATE SELECT COMMITTEE ON NATIONAL WATER RESOURCES

A Resources for the Future Staff Report by Vera F. Eliasberg

The population projections shown in tables I to XI of Part I of this committee print are to be considered not as accurate predictions of the future but rather as extensions of observed past trends. They are meant to indicate the "most likely" range of future developments under certain specific assumptions. The further into the future the period is to which the projections are to apply and the smaller the subdivisions of the country to which they refer, the greater are the unpredictable influences which may modify the future trends. Hence the reservations made for projections of the total U.S. population to the year 2000 apply with increased force to projections for the 22 water resource regions and still more to projections for such small geographical units as standard metropolitan areas.

Resources for the Future's projections for the total continental U.S. population differ somewhat from those developed by other demographers as, for instance, the Census Bureau, but they have been used as the basis for the projections for geographical subdivisions and for certain population segments, such as urban versus rural populations, which form the basis for the studies of the Senate Select Committee on National Water Resources. It is worthy of note that (*a*) the discrepancies between Resources for the Future and Census "totals" are comparatively slight, certainly below the inevitable margin of error inherent in projections covering a period of more than 40 years, and (*b*) even near-perfect agreement between more or less independently developed projections does not increase their claim to accuracy. On the other hand, in the absence of any recognized and proven methods of accurately predicting future population growth, good agreement between various projections arrived at by different sources or by the use of alternative methods for one and the same specific problem makes them appear "reasonable"; at least it indicates an awareness of and agreement about certain underlying assumptions which permit a uniform and "correct" interpretation of the projections and their periodic critical review and adjustment.

In the following paragraphs the Resources for the Future population projections, as set forth in Part I, tables I to XI, are compared with corresponding Census Bureau projections as shown in Part II, tables 1 to 6, and the differences are discussed. In addition, Resources for the Future projections for standard metropolitan areas, which are subject to greater uncertainties than projections for the country as a whole are examined and tested in some detail by the use of alternative methods.

COMPARISON OF RESOURCES FOR THE FUTURE AND CENSUS BUREAU POPULATION PROJECTIONS

Total population of the continental United States (excluding Alaska and Hawaii, and Armed Forces abroad)

Table A summarizes the actual population growth between 1900 and 1960 in order to provide a sort of historical background for the three sets (high, middle, and low) of Resources for the Future projections for the period 1970–2000. The three series show a wide range for the total U.S. population by the year 2000; the "high" exceeds the "low" by some 164 million or more than 60 percent. This wide range appears somewhat less startling if expressed in average annual rates of growth. Taking the 1960–2000 period as a whole, the "low" of 267 million for the latter year implies a growth rate of 1 percent, the "high" of 431 million an annual growth of 2.2 percent. Although a sustained growth rate of 2.2 percent is certainly on the high side (it is meant to be) it does not appear impossible. In the first half of this century, between 1900 and 1950, the U.S. population expanded at an average annual rate of 1.4 percent

(varying from 0.7 to 2 percent in different decades). The same annual rate, continuing over the second half of this century, would bring the U.S. population to 302 million by 2000, which is only 8.2 percent less than the "middle" Resources for the Future projection of 329 million.

TABLE A.—*Growth rates of population, continental United States, excluding Armed Forces overseas*

	Population	Percentage increase		Average annual rate of growth (percent)
	Millions			
CENSUS DATA				
1900—June	76.0			
1910—April	92.6	1900–1910	+21.85	2.0
1920—January	105.7	1910–1920	+14.89	1.4
1930—April	122.8	1920–1930	+16.18	1.5
1940—April	131.7	1930–1940	+7.25	.7
1950—April	150.7	1940–1950	+14.43	1.4
1960—April[1]	177.8	1950–1960	+17.98	1.7
RESOURCES FOR THE FUTURE PROJECTIONS				
1970—Low	201.0	1960–1970	+13.05	1.2
Middle	207.0		+16.42	1.5
High	222.0		+24.86	2.2
1980—Low	225.0	1970–1980	+11.94	1.1
Middle	244.0		+17.87	1.7
High	278.0		+25.23	2.3
1990—Low	248.0	1980–1990	+10.22	1.0
Middle	286.0		+17.21	1.6
High	347.0		+24.82	2.2
2000—Low	267.0	1990–2000	+7.66	.7
Middle	329.0		+15.03	1.4
High	431.0		+24.21	2.2

[1] Preliminary

Table B compares the Resources for the Future projections of total population growth with those of the Census Bureau. For 1970 the Resources for the Future "low" is very close to the Census data; for 1980 it is 2.2 percent lower; and for 2000, 8.7 percent lower than the Census Series IV. The Resources for the Future "high" projection exceeds the Census Series II by 4.2 percent in 1970; 7.3 percent in 1980; and 13.2 percent in the year 2000.

It was to be expected that the discrepancy between the Resources for the Future "high" projection and the Census Series II would be larger than that between the Resources for the Future "low" and the Census Series IV. Series IV represents the lowest of all Census projections, but series II is the second highest. If the highest Census projection (series I) is adjusted to exclude Alaska and Hawaii and the estimated Armed Forces abroad it results in a total population of some 416 million in 2000. The Resources for the Future "high" of 431 million exceeds the Census Series I by only 3.6 percent over a 40-year period.

Detailed Census projections of population by States, urban population, for selected river basins and selected metropolitan areas are available only for the Census Series II and IV. In the following, these are compared with the "low" and "high" Resources for the Future projections for the corresponding subdivisions.

TABLE B.—*Comparison of Resources for the Future and Census population projections: U.S. totals (excluding Alaska and Hawaii and excluding Armed Forces abroad)*

	Population in millions		
	1970	1980	2000
Resources for the Future low	201.0	225.0	267.0
Census Series IV	201.7	230.0	292.3
Resources for the Future high	222.0	278.0	431.0
Census Series II	213.0	259.2	380.9
	Percentages		
Resources for the Future low expressed as a percentage of Census Series IV	99.7	97.8	91.3
Resources for the Future high expressed as a percentage of Census Series II	104.2	107.3	113.2

Total population of States

The Census Bureau supplied projections of population by States, based on its series II and series IV for total U.S. population and on two different assumptions regarding migration. These Census estimates of the percentage share of the individual States in the total U.S. population were adopted by Resources for the Future. But since the Resources for the Future national totals differed from the Census totals a proportionate adjustment to Resources for the Future totals had to be made. Thus the discrepancies between Resources for the Future and Census projections of State populations reflect only the above-described discrepancies in the national totals.

Urban population by States and by water resource regions

The Census projections of urban population by States for series II and series IV and for two different migration assumptions, served as the basis for the Resources for the Future estimates of the urban population by water resource regions. As

the Census projections of the urban population were broken down by States, and the Resources for the Future projections were broken down by water resources regions, only the aggregates for the United States as a whole can be compared. This is done in table C. There are no discrepancies between the Census and the Resources for the Future projections of *total* urban population other than those resulting from the differences in the total population figures for the period 1970–2000 and from rounding.

TABLE C.—*Comparison of Resources for the Future and Census projections of urban population for the year 2000*

	Population in millions	Resources for the Future projections as a percentage of Census projections
Resources for the Future "low," migration assumption No. 1	204.0	91.3
Census Series IV, migration assumption No. 1	223.4	
Resources for the Future "low," migration assumption, No. 2	186.0	90.9
Census Series IV, migration assumption, No. 2	204.6	
Resources for the Future "high," migration assumption, No. 1	330.0	113.4
Census Series II, migration assumption, No. 1	291.1	
Resources for the Future "high," migration assumption, No. 2	300.0	112.5
Census Series II, migration assumption, No. 2	266.6	

Population in selected river basins

Census made illustrative projections for a number of selected water resource regions (or river basins) which are compared with the Resources for the Future projections for the same or similar regions in table D. Both sets of projections are based on the ratio of the population in a certain river basin (or water resource region) to the population of the States which are partly or wholly located in that basin. But Resources for the Future computed these percentages separately for each State, that is, the population of each State was distributed among all the water resource regions in which the State is located. Census related the total population of a river basin to the sum of the total population of all States which are partly or wholly located in that basin.

TABLE D.—*Comparison of Resources for the Future and Census projections of total population in selected river basins*

River basin	1950		1970				2000			
	Resources for the Future	Census	Resources for the Future, low, migration assumption—		Census series—		Resources for the Future, low, migration assumption—		Census series—	
			No. 1	No. 2	IV-1	IV-2	No. 1	No. 2	IV-1	IV-2
Arkansas-White-Red ..... millions	7.0	7.1	7.4	7.9	7.5	7.6	7.8	9.5	8.5	8.9
Colorado ..... do	1.2	1.1	2.4	2.2	2.4	2.3	4.0	3.4	4.9	4.5
Lower Mississippi ..... do	4.1	4.2	4.6	5.0	5.0	5.4	5.4	6.5	6.5	7.8
Missouri ..... do	7.5	7.5	9.1	9.2	9.1	9.1	10.8	11.4	11.6	12.2
Ohio ..... do	16.2	16.2	19.5	19.9	19.3	19.4	24.2	25.4	25.5	26.0
Pacific Northwest ..... do	4.6	4.7	6.3	6.4	6.4	6.5	9.1	8.9	10.1	9.9
Upper Rio Grande-Pecos ..... do	1.0	1.0	1.6	1.6	1.7	1.7	2.5	2.6	3.2	3.1
Total ..... do			50.9	52.2	51.4	52.0	63.8	67.7	70.3	72.4
Resources for the Future expressed as a percentage of Census			99.0	100.4			90.8	93.5		
			Resources for the Future, high, migration assumption—		Census series—		Resources for the Future, high, migration assumption—		Census series—	
			No. 1	No. 2	II-1	II-2	No. 1	No. 2	II-1	II-2
Arkansas-White-Red ..... millions			8.2	8.8	8.0	8.1	12.5	15.2	11.2	11.7
Colorado ..... do			2.7	2.4	2.6	2.4	6.5	5.5	6.3	5.8
Lower Mississippi ..... do			5.1	5.6	5.3	5.7	8.7	10.5	8.7	10.2
Missouri ..... do			10.1	10.1	9.6	9.7	17.5	18.4	15.3	15.9
Ohio ..... do			21.5	22.0	20.3	20.5	39.1	41.1	33.3	33.9
Pacific Northwest ..... do			6.9	7.1	6.7	6.8	14.7	14.3	13.1	12.9
Upper Rio Grande-Pecos ..... do			1.8	1.8	1.8	1.8	4.1	4.2	4.1	4.0
Total of above ..... do			56.3	57.8	54.3	55.0	103.1	109.2	92.0	94.4
Resources for the Future expressed as a percentage of Census			103.7	105.1			112.1	115.7		

Even if only a small portion of a State belongs to a certain river basin, the total population of that State becomes a component of the denominator of the basin/sum of States ratio.

Then Resources for the Future assumed that the percentage of the State (or States) population in each water resource region in 1960 would be equal to the percentage in 1950, multiplied by the ratio of the 1950 to the 1940 percentage; and that the percentage of the State (or States) population in each river basin in the year 2000 would be equal to the 1960 percentage, multiplied by the ratio of the 1950 to the 1930 percentage.

Census assumed that the change in the ratio of the population in each river basin to the sum of the total population of all States partly or wholly located in that basin, between 1958 and 1970 would be the same as the change in this ratio between 1950 and 1958; and that between 1970 and 2000 the change in this ratio would be the same as between 1940 and 1958.

In both Resources for the Future and Census projections, the proportions so obtained were then applied to the projected total State populations for 1970 and 2000. Thus the discrepancies between Resources for the Future and Census projections for selected river basins reflect (*a*) the comparatively small differences between Resources for the Future and Census totals for the projected population of each State; (*b*) the more substantial differences resulting from the different methods of computing the basin/sum of States ratios; and (*c*) the differences resulting from the different assumptions as to the movement of these ratios. Specifically, the Resources for the Future projections for 2000 take into account a somewhat longer historical period, including the 1930–40 decade.

In view of the differences in the methods used it is rather surprising that the two sets of projections did not turn out to be further afield from each other. For the sum of the seven river basins, for which Census made projections, comprising about one-quarter of the total U.S. population, the discrepancies between the Resources for the Future and the Census series are well within the limits given by the differences between the two sets of projections for the total U.S. population. For the year 2000 the two Resources for the Future series for "low" are 6 to 9 percent below the Census Series IV–1 and IV–2. The two "high" Resources for the Future projections exceed the Census Series II–1 and II–2 for the year 2000 by 12 to 16 percent. However, in two cases the Resources for the Future "high" projections exceed those of Census by a larger margin: for the year 2000 the Resources for the Future "high" (migration assumption No. 2) for the Ohio River Basin is 21 percent higher than the corresponding Census projection. For the Arkansas-White-Red River Basin the Resources for the Future "high" (migration assumption No. 2) exceeds the Census series by 30 percent.

Table E retraces the Resources for the Future and the Census projections for the latter river basin step by step. This comparison shows that the greater part of the discrepancy is due to the different methods of computing the river basin/sum of States population ratios. If the Resources for the Future method of projection were applied to Census data for State populations, the discrepancy between the two sets of estimates would be only 12 percent for the year 2000. (The Arkansas-White-Red River Basin includes only a small part of Texas, but the whole State of Texas is included in the sum of all State populations which is the denominator of the basin/sum of States ratio in the Census estimates. In the case of those river basins which include a much larger portion of the State populations, the discrepancies between Resources for the Future and Census projections are much smaller.)

TABLE E.—*Resources for the Future and Census projections of population in the Arkansas-White-Red River Basin for the year 2000, migration assumption No. 2, Resources for the Future "high," Census Series II–2*

[Population figures in thousands, year 2000]

(1) TOTAL POPULATION OF STATES LOCATED PARTLY OR WHOLLY IN THE BASIN

	Resources for the Future	Census
Arkansas	3,403	3,007
Colorado	4,610	4,059
Kansas	4,868	4,305
Louisiana	8,142	7,212
Missouri	9,133	8,057
New Mexico	2,671	2,348
Oklahoma	4,523	3,989
Texas	25,116	22,216
Total	62,466	55,193
Resources for the Future projections expressed as a percentage of Census projections	113.2	

TABLE E.—*Resources for the Future, etc.*—Continued

(2) PROJECTION OF POPULATION OF RIVER BASIN FOR THE YEAR 2000, RESOURCES FOR THE FUTURE METHOD

Formula:

Percentage of total State population residing in river basin in 1960=the 1950 percentage multiplied by the ratio of the 1950 percentage to the 1940 percentage;

Percentage of total State population residing in river basin in 2000=the 1960 percentage multiplied by the ratio of the 1950 percentage to the 1930 percentage.

	Percent in river basin in 2000	Applied to above State totals	
		Resources for the Future	Census
Lower Arkansas-White-Red:			
Arkansas	76.9	2,607	2,312
Kansas	10.3	483	443
Louisiana	23.8	1,925	1,716
Missouri	10.8	969	870
Oklahoma	36.0	1,613	1,436
Texas	1.9	457	422
Total		8,054	7,199
Upper Arkansas-Red:			
Colorado	18.5	833	751
Kansas	42.0	1,902	1,808
New Mexico	2.8	72	66
Oklahoma	64.7	2,909	2,581
Texas	5.4	1,321	1,200
Total		7,127	6,406
Total, Arkansas-White-Red		[1] 15,181	13,605
Resources for the Future expressed as a percentage of Census		111.6	

[1] Slightly adjusted so that the data for all the basins into which a State was divided add up to 100 percent; the unadjusted total is 15,372.

(3) PROJECTION OF POPULATION OF RIVER BASIN, CENSUS METHOD

Formula:

Compute population in river basin as a percentage of the sum of the total population in the 8 States, parts of which are located in the basin, for 1940, 1950, and 1958.

Change in this percentage between 1958 and 1970 assumed to be the same as between 1950 and 1958

Change in this percentage between 1970 and 2000 assumed to be the same as between 1940 and 1958.

	Total State populations				
	1940	1950	1958	1970	2000
Arkansas	1,949	1,910	1,766	1,962	3,007
Colorado	1,123	1,325	1,711	2,179	4,059
Kansas	1,801	1,905	2,116	2,519	4,305
Louisiana	2,364	2,684	3,110	3,911	7,212
Missouri	3,785	3,955	4,271	4,923	8,057
New Mexico	532	681	842	1,144	2,348
Oklahoma	2,336	2,233	2,285	2,559	3,989
Texas	6,415	7,711	9,377	11,926	22,216
Total	20,305	22,404	25,478	31,123	55,193
Population in river basin	7,090	7,076	7,286		
As percent of above total	34.9	31.6	28.6	25.9	21.2
Projected population in river basin, Series II-2 [2]				8,061	11,701

[2] The census figures given are 8,074,000 for 1970 and 11,727,000 for 2000; the slight discrepancies are apparently due to rounding.

Population of selected standard metropolitan areas

Census made illustrative projections for a number of selected standard metropolitan areas which are compared with the corresponding Resources for the Future estimates in tables F and G. The two sets of projections are based on different assumptions. Census starts out with the ratio of the population of a standard metropolitan area to the total population of the State in which this standard metropolitan area is located; Resources for the Future with the ratio of the population of a selected standard metropolitan area to the total standard metropolitan area population of a water resource region. Then Resources for the Future assumes that in 1970 the ratio of the population in a selected standard metropolitan area to the total standard metropolitan area population of the basin will be equal to the 1958 ratio plus (or minus) the average change in this ratio between 1940 and 1950 and between 1950 and 1958 (each change given equal weight). For the year 2000 Resources for the Future assumes that the ratio of the population in a selected standard metropolitan area to the total standard metropolitan area population in the water resource region will be equal to the 1970 ratio plus (or minus) the sum of the changes in this ratio between 1940 and 1950 and between 1950 and 1958. Census assumes that the change in the ratio of the population of a selected standard metropolitan area to the total population of the State (or the States), within which the area is located, between 1958 and 1970 will be the same as the change in this ratio between 1950 and 1958. For the 1970–2000 period Census assumes that the change in this ratio will be the same as between 1940 and 1958. In the Census projections the proportions so obtained were applied to the projected total State populations; in the Resources for the Future estimates the proportions were applied to the total projected standard metropolitan area population in a water resource region.

TABLE F.—*Comparison of Resources for the Future and Census projections of population in selected standard metropolitan areas ("low" projections)*

[Population figures in millions]

	RFF, low, migration assumption No. 1; Census Series IV-1			RFF, low, migration assumption No. 2; Census Series IV-2		
	1970	1980	2000	1970	1980	2000
Albuquerque:						
RFF	0.3	0.4	0.8	0.3	0.5	0.8
Census	0.3	0.5	1.0	0.3	0.5	1.1
RFF/Census (percent)	100.0	80.0	80.0	100.0	100.0	72.7
Boston:						
RFF	3.1	3.3	3.5	3.2	3.4	3.7
Census	2.6	2.8	3.3	2.7	3.0	3.7
RFF/Census (percent)	119.2	117.9	106.1	118.5	113.3	100.0
Dallas:						
RFF	1.2	1.5	2.1	1.2	1.5	2.1
Census	1.3	1.7	2.6	1.3	1.7	2.6
RFF/Census (percent)	92.3	88.2	80.8	92.3	88.2	80.8
Fort Worth:						
RFF	0.9	1.2	1.9	0.9	1.2	1.9
Census	0.9	1.2	2.0	0.8	1.2	2.0
RFF/Census (percent)	100.0	100.0	95.0	112.5	100.0	95.0
Houston:						
RFF	1.7	2.1	3.1	1.6	2.1	3.0
Census	1.7	2.3	3.8	1.6	2.2	3.7
RFF/Census (percent)	100.0	91.3	81.6	100.0	95.5	81.1
Kansas City:						
RFF	1.2	1.4	1.7	1.3	1.4	1.8
Census	1.2	1.4	2.1	1.2	1.5	2.2
RFF/Census (percent)	100.0	100.0	81.0	108.3	93.3	81.8
Los Angeles:						
RFF	7.4	9.3	12.2	7.0	8.4	10.5
Census	9.0	11.5	16.5	8.5	10.4	14.5
RFF/Census (percent)	82.2	80.9	73.9	82.4	80.8	72.4
New York:						
RFF	16.2	17.7	20.5	16.1	17.5	20.2
Census	16.0	17.9	22.0	15.9	17.6	21.5
RFF/Census (percent)	101.3	98.9	93.2	101.3	99.4	94.0
Philadelphia:						
RFF	4.9	5.4	6.5	4.8	5.3	6.4
Census	4.9	5.6	7.4	5.0	5.8	7.8
RFF/Census (percent)	100.0	96.4	87.8	96.0	91.4	82.1
Phoenix:						
RFF	0.9	1.3	2.0	0.8	1.2	1.7
Census	0.9	1.2	2.1	0.8	1.1	1.8
RFF/Census (percent)	100.0	108.3	95.2	100.0	109.1	94.4
San Francisco:						
RFF	3.6	4.4	5.6	3.4	4.0	4.8
Census	3.1	3.8	4.9	3.0	3.5	4.3
RFF/Census (percent)	116.1	115.8	114.3	113.3	114.3	111.6
Washington, D.C.:						
RFF	2.6	3.2	4.6	2.6	3.2	4.6
Census	2.6	4.0	7.6	2.7	4.0	7.4
RFF/Census (percent)	100.0	80.0	60.5	96.3	8.0	62.2
12 Standard metropolitan areas:						
RFF	44.0	51.2	64.5	43.2	49.7	61.5
Census	44.5	53.9	75.3	43.8	52.5	72.6
RFF/Census (percent)	98.9	95.0	85.7	98.6	94.7	84.7
United States total, RFF/Census (percent)	99.7	97.8	91.3			

TABLE G.—*Comparison of Resources for the Future and Census projections of population in selected standard metropolitan areas ("high" projections)*

[Population figures in millions]

	RFF, high, migration assumption No. 1; Census Series II-1			RFF, high, migration assumption No. 2; Census Series II-2		
	1970	1980	2000	1970	1980	2000
Albuquerque:						
RFF	0.4	0.6	1.2	0.4	0.6	1.2
Census	0.3	0.6	1.4	0.4	0.6	1.4
RFF/Census (percent)	133.3	100.0	85.7	100.0	100.0	85.7
Boston:						
RFF	3.4	4.0	5.7	3.5	4.2	6.0
Census	2.7	3.4	4.4	2.9	3.4	4.8
RFF/Census (percent)	125.9	117.6	129.5	120.7	123.5	125.0
Dallas:						
RFF	1.4	1.9	3.5	1.3	1.8	3.4
Census	1.4	2.0	3.4	1.4	1.9	3.4
RFF/Census (percent)	100.0	95.0	102.9	92.9	94.7	100.0
Fort Worth:						
RFF	1.0	1.5	3.1	1.0	1.5	3.0
Census	0.9	1.4	2.6	0.9	1.3	2.5
RFF/Census (percent)	111.1	107.1	119.2	111.1	115.4	115.4
Houston:						
RFF	1.9	2.6	5.0	1.8	2.6	4.9
Census	1.8	2.6	4.9	1.7	2.5	4.8
RFF/Census (percent)	105.6	100.0	102.0	105.9	104.0	102.1
Kansas City:						
RFF	1.4	1.7	2.6	1.4	1.7	2.8
Census	1.3	1.6	2.7	1.3	1.7	2.8
RFF/Census (percent)	107.7	106.3	96.3	107.7	100.0	100.0
Los Angeles:						
RFF	8.2	11.5	19.6	7.7	10.3	17.0
Census	9.4	12.8	21.0	8.9	11.7	18.6
RFF/Census (percent)	87.2	89.8	93.3	86.5	88.0	91.4
New York:						
RFF	17.9	21.9	33.1	17.7	21.7	32.7
Census	16.8	20.0	28.5	16.7	19.7	27.9
RFF/Census (percent)	106.5	109.5	116.1	106.0	110.2	117.2
Philadelphia:						
RFF	5.3	6.7	10.5	5.3	6.6	10.3
Census	5.2	6.3	9.7	5.3	6.5	10.1
RFF/Census (percent)	101.9	106.3	108.2	100.0	101.5	102.0
Phoenix:						
RFF	1.0	1.6	3.3	0.9	1.4	2.8
Census	0.9	1.4	2.7	0.8	1.2	2.3
RFF/Census (percent)	111.1	114.3	122.2	112.5	116.7	121.7
San Francisco:						
RFF	4.0	5.4	8.9	3.7	4.9	7.8
Census	3.3	4.2	6.2	3.1	3.9	5.5
RFF/Census (percent)	121.2	128.6	143.5	119.4	125.6	141.8
Washington, D.C.:						
RFF	2.9	4.0	7.4	2.9	4.0	7.4
Census	2.9	4.5	9.8	2.8	4.5	9.6
RFF/Census (percent)	100.0	88.9	75.5	103.6	88.9	77.1
12 standard metropolitan areas:						
RFF	48.8	63.4	103.9	47.6	61.3	99.3
Census	46.9	60.8	97.3	46.2	58.9	93.8
RFF/Census (percent)	104.1	104.3	106.8	103.0	104.1	105.9
United States total, RFF/Census (percent)	104.1	107.3	113.2			

Thus the two sets of estimates reflect the discrepancies between the Resources for the Future and Census projections of total State populations and total river basin or water resources regions populations. But of greater importance is the fact that in the Census projections the population of a selected standard metropolitan area is related to the total State population, while Resources for the Future relates it to the total standard metropolitan area population of the water resource

region which in many cases includes parts of various States.

In contrast to the projections of the total U.S. population and the population in selected river basins or water resource regions, the discrepancies between the Resources for the Future and Census estimates for the sum of 12 selected standard metropolitan areas are larger for the "low" than for the "high" projections. The Resources for the Future "low" for the year 2000 is 14 to 15 percent lower than the Census Series IV–1 and IV–2; the Resources for the Future "high" is only 6 to 7 percent above the Census Series II–1 and II–2. This indicates that the Resources for the Future projections of standard metropolitan area populations tend to be on the low side. (See the following section on "Total Standard Metropolitan Area Population.")

Of the 12 selected standard metropolitan area's compared the largest discrepancies occur in the following cases:

(*a*) Boston: This is due to different area coverage. Resources for the Future includes, Census excludes Lowell and Lawrence in the Boston standard metropolitan area. This is the only one of the 12 cases examined in which the areas are not identical.

(*b*) Washington, D.C.: Resources for the Future "low" is some 38 percent lower than Census Series IV; Resources for the Future "high" is more than 20 percent below the Census Series II figure for the year 2000. The reason appears to be that the Census projection is based on the ratio of the Washington standard metropolitan area population to the population of Maryland and Virginia, while the Resources for the Future projection relates it to the total standard metropolitan area population in the Chesapeake Bay Basin which includes not only part of Maryland and Virginia, but also parts of New York and Pennsylvania.

(*c*) San Francisco: The Resources for the Future "high" for 2000 is some 40 percent above the Census Series II, and even the Resources for the Future "low" exceeds the Census Series IV by 12 to 14 percent. In this case, too, the large discrepancy seems to be due to the fact that Census relates the growth of the San Francisco standard metropolitan area to the total population growth of California while Resources for the Future relates it to the change in the standard metropolitan area population in the Central Pacific Basin only.

(*d*) Los Angeles: The Resources for the Future "low" for 2000 is some 28 percent below the Census Series IV and even the Resources for the Future "high" remains some 8 percent below the Census Series II. The reason appears to be the same in the case of San Francisco but, obviously, with the opposite result.

(*e*) Phoenix, and

(*f*) Albuquerque: These are the remaining two cases which show large discrepancies between Resources for the Future and Census projections for the year 2000. Again, this appears to be due mainly to the fact that Census relates the Phoenix standard metropolitan area population growth to that of the State of Arizona, while the Resources for the Future projection is based on the ratio of the Phoenix standard metropolitan area population to the total standard metropolitan area population in the Colorado River Basin which includes also parts of California, Nevada, Utah, and Wyoming. Similarly, the Census projection for the Albuquerque standard metropolitan area is tied to the population change in the State of New Mexico; the Resources for the Future projection to the total standard metropolitan area population in the Upper Rio Grande and Pecos River Basin which includes part of the States of Colorado and Texas.

For the other seven selected standard metropolitan areas examined the discrepancies between Resources for the Future and Census projections for the year 2000 are very much smaller and the direction is the same as the differences between the total U.S. population projections, that is, the Resources for the Future "low" is lower and the Resources for the Future "high" higher than the corresponding Census series.

ALTERNATIVE PROJECTIONS OF STANDARD METROPOLITAN AREA POPULATION

The Resources for the Future projections of standard metropolitan area population are based on the ratio of standard metropolitan area population to total population in each water resource region. These estimates were then added up to arrive at the total standard metropolitan area population of the United States. This method results for the year 2000 in a total standard metropolitan area population amounting to 68.9 percent of the national population. Comparison with projections made by others indicates that these Resources for the Future estimates may be some-

what too low. See, for instance, Jerome P. Pickard "Metropolitanization of the United States," Urban Land Institute, Research Monograph No. 2, 1959; Pickard estimates for the year 2000 a total standard metropolitan area population amounting to 73.6 percent of the U.S. population. The comparison is shown in table H.

TABLE H.—*Comparison of Pickard's and Resources for the Future's projections of standard metropolitan area population in 2000*

[Cf. J. P. Pickard, "Metropolitanization of the United States," tables 3 and 10]

PICKARD (1956-2000)

[Population in thousands]

	U.S. population	Standard metropolitan area population	Other	Standard metropolitan area as percent of total
1956	167,259	89,646	77,613	53.6
2000	320,000	235,500	84,500	73.6
Increase	152,741	145,854	6,887	20.0
Increase in percent	91.3	162.7	8.9	
Percent of total population increase		95.5	4.5	
Standard metropolitan area increase/total increase index, total equals 100, standard metropolitan area equals		178		

RESOURCES FOR THE FUTURE MIDDLE PROJECTION

(1958-2000)

[Population in millions]

	U.S. population	Standard metropolitan area population	Other	Standard metropolitan area as percent of total
1958	174.1	103.9	70.2	59.7
2000, No. 1	329.0	227.0	102.0	69.0
2000, No. 2	329.0	225.0	104.0	68.4
Increase	154.9			
No. 1		123.1	31.8	9.3
No. 2		121.1	33.8	8.7
Increase in percent	89.0			
No. 1		118.5	45.3	
No. 2		116.6	48.1	
Percent of total population increase:				
No. 1		79.5	20.5	
No. 2		78.2	21.8	
Standard metropolitan area increase/total increase index, total equals 100, standard metropolitan area equals:				
No. 1		133		
No. 2		131		

NOTE.—Pickard assumes that between 1956 and 2000 the number of major metropolitan areas will increase from 69 to 145; the number of all metropolitan areas from 150 to 300 (in his definition a metropolitan area equals an area population of 100,000 or more, including an urban area, but not necessarily a city of 50,000 or more; a major metropolitan area equals a metropolitan area with population of 250,000 or more). (Cf. pp. 30, 31, 74).

U.S. total standard metropolitan area population

To test the Resources for the Future projections several alternative estimates were made, based on different assumptions and different methods.

The standard metropolitan area population for the United States as a whole was estimated not by starting out with the ratio of standard metropolitan area to total population, but by extrapolating the growth of the standard metropolitan area population at the same average rate as between 1940 and 1958, that is, 2.2 percent per year. This yields for 1970 a total standard metropolitan area population of 135 million and for 2000 of 259 million, or 65.2 and 78.7 percent of the national population. These data may be considered as corresponding to the Resources for the Future projection "middle," migration assumption No. 1, shown in table XI, Part I (130 million or 62.8 percent of the U.S. population in 1970 and 227 million or 69 percent of the total in 2000).

The new totals were distributed among the water resource regions as follows: The percentage share of each region in the total standard metropolitan area population of the United States was computed for 1940 and 1958. The percentage share of each region in 1970 was assumed to equal the 1958 percentage share plus (or minus) one-half of the difference between the 1940 and the 1958 percentage. The percentage share of each region in the year 2000 was assumed to equal the 1970 percentage plus (or minus) the difference between the 1940 and the 1958 percentage. These proportions are shown in table J. They were applied to the new estimated total standard metropolitan area population to yield the standard metropolitan area population for each region. (See table K.) This method results in estimates which appear to be somewhat too high for the year 2000 (78.7 percent of the national population). If the new estimates and the Resources for the Future projection as shown in table IX, Part I, middle series, under migration assumption No. 1, were averaged they would yield a standard metropolitan area population amounting to 63.9 percent of the national population in 1970 and to 73.9 percent in 2000. These adjusted new estimates, distributed among water resource regions, are shown in table L.

TABLE J.—*All standard metropolitan area population in individual water resource regions as a percent of total U.S. standard metropolitan area population*

	1940	1958	1970 [1]	2000 [2]
New England	9.35	7.38	5.45	4.39
Delaware and Hudson	24.50	20.74	18.86	15.10
Chesapeake Bay	6.07	6.04	6.03	5.99
Southeast	5.41	6.72	7.37	8.68
Eastern Great Lakes	8.69	8.62	8.59	8.52
Western Great Lakes	10.33	9.69	9.37	8.78
Ohio River	9.93	8.72	8.12	6.95
Cumberland	.37	.35	.34	.32
Tennessee	.81	.74	.71	.64
Upper Mississippi	5.13	4.93	4.83	4.63
Lower Mississippi	1.42	1.57	1.65	1.80
Upper Missouri	1.55	1.67	1.73	1.85
Lower Missouri	1.11	1.06	1.02	.98
Upper Arkansas-Red	.84	1.12	1.26	1.40
Lower Arkansas-White-Red	.84	.92	.96	1.04
Western Gulf	3.08	4.44	5.12	6.48
Upper Rio Grande and Pecos	.28	.49	.60	.81
Colorado	.26	.53	.67	.95
Great Basin	.38	.45	.49	.56
Pacific Northwest	1.93	2.23	2.38	2.68
Central Pacific	3.02	4.07	4.60	5.42
South Pacific	4.79	7.52	8.89	11.62
United States	100.00	100.00	100.00	100.00

[1] 1970 percent of total standard metropolitan area=1958 percent±½ difference between 1940 percent and 1958 percent.

[2] 2000 percent of total standard metropolitan area=1970 percent± difference between 1940 percent and 1958 percent.

TABLE K.—*All standard metropolitan area population by water resource region (projections corresponding to "middle," migration assumption No. 1)*

[Population in thousands]

	1940	1958	1970	2000
New England	6,498	7,673	8,701	11,397
Delaware and Hudson	17,210	21,546	25,442	39,031
Chesapeake Bay	4,265	6,276	8,134	15,483
Southeast	3,802	6,982	9,942	22,498
Eastern Great Lakes	6,101	8,952	11,588	22,084
Western Great Lakes	7,253	10,065	12,640	22,758
Ohio River	6,976	9,060	10,954	18,014
Cumberland	257	359	459	829
Tennessee	567	766	958	1,659
Upper Mississippi	3,603	5,123	6,515	12,010
Lower Mississippi	998	1,636	2,226	4,666
Upper Missouri	1,087	1,734	2,334	4,796
Lower Missouri	781	1,101	1,376	2,540
Upper Arkansas-Red	591	1,168	1,700	3,629
Lower Arkansas-White-Red	590	961	1,295	2,696
Western Gulf	2,161	4,614	6,907	16,796
Upper Rio Grande and Pecos	200	511	809	2,099
Colorado	186	549	904	2,463
Great Basin	269	473	661	1,452
Pacific Northwest	1,353	2,317	3,210	6,946
Central Pacific	2,120	4,228	6,205	14,018
South Pacific	3,368	7,812	11,992	30,119
United States	70,234	103,906	134,952	258,482

TABLE L.—*Projected population, all standard metropolitan areas by water resource region, "middle" migration assumption No. 1*

[Population in millions]

	1970	2000
New England	8.6	12.2
Delaware and Hudson	25.2	38.8
Chesapeake Bay	7.9	14.4
Southeast	9.8	20.5
Eastern Great Lakes	11.4	20.6
Western Great Lakes	12.6	22.0
Ohio River	10.9	17.7
Cumberland	.4	.8
Tennessee	1.0	1.6
Upper Mississippi	6.4	11.2
Lower Mississippi	2.1	4.2
Upper Missouri	2.3	4.4
Lower Missouri	1.4	2.4
Upper Arkansas-Red	1.6	3.2
Lower Arkansas-White-Red	1.2	2.4
Western Gulf	6.8	15.4
Upper Rio Grande and Pecos	.8	1.9
Colorado	1.0	2.5
Great Basin	.6	1.4
Pacific Northwest	3.0	6.2
Central Pacific	6.2	13.3
South Pacific	11.1	26.0
United States	132.3	243.1
Standard metropolitan areas as percent of total U.S. population	63.9	73.9

The main reason why the Resources for the Future projections of standard metropolitan area population might be somewhat low appears to be the following: These projections are based on the change in the ratios of standard metropolitan area population to total population in 1940, 1950, and 1958. In computing these ratios the standard metropolitan area population was measured with reference to the same geographic areas that were designated as standard metropolitan areas in 1950, in spite of the fact that certain areas did not meet the requirements for designation of standard metropolitan areas in 1940. If the same ratio method were used as was done in the Resources for the Future projections, but if the 1940 ratio of standard metropolitan area to total population were based on the actual standard metropolitan area population in 1940, the standard metropolitan area population in 2000 would amount to 71.3 (instead of 68.9 percent) of the national population.

Between 1940 and 1958 the proportion of the aggregate standard metropolitan area population

to the total U.S. population increased at an average annual rate of 0.9 percent, that is, if the 1940 percentage share is based on the *actual* standard metropolitan area population in 1940. If the change in the proportion of standard metropolitan area to total population is computed starting with a 1940 standard metropolitan area population which includes the population in areas that became standard metropolitan areas only in 1950, the average annual growth rate of the ratio of standard metropolitan area to total population would be 0.6 percent. Incidentally, in recent years, between 1950 and 1958, the percentage share of standard metropolitan area population in the total population increased also at a rate of 0.6 percent. Assuming a slightly lower growth rate for the period 1958 to 2000, say, 0.5 percent per year, this would raise the percentage share of the standard metropolitan area population in the total U.S. population from 59.68 percent in 1958 to 73.59 percent in 2000. (The last figure is identical with the standard metropolitan area share projected by Pickard for the year 2000.)

These alternative estimates raise the Resources for the Future projection of the aggregate standard metropolitan area population by 3.5 to 6 percent for the year 2000; a small difference for a period of some 40 years.

Selected standard metropolitan area populations

The Resources for the Future projections are based on assumptions concerning the changes in the percentage which the population of a selected metropolitan area constituted of the total population of all metropolitan areas in a water resource region. The Census projections relate the population of a selected metropolitan area to the total population of the State (or the States) which contain this area. The discrepancies in the projections resulting from these different methods have been discussed earlier.

In the absence of recognized tested methods for projecting the population of a specific metropolitan area it is difficult to appraise the advantages and drawbacks of the two described methods. There are no a priori arguments stipulating that a specific area will grow in a certain relation either to all other metropolitan areas in a region or to the total population of a State. Both, a river basin and a State may include heterogenous regions whose growth is governed by different influences. Thus, the southeast region includes the metropolitan areas of Florida, which may expand as retirement centers, as well as the area of Birmingham, Ala., which may grow as an industrial center. Likewise, southern California and its metropolitan areas may grow at a different pace than the northern part of the State. As stated in the note to table XI, Part I, Birmingham turned out to be a case in which the Resources for the Future projection led to implausible results. It had to be replaced by a projection based on Birmingham's development in recent decades, without relating it to other metropolitan areas in the southeast water resource region.

This alternative method of developing the projection of the population of a specific standard metropolitan area by extrapolating its growth rate in the 1940–58 period has been tested for all the 36 selected metropolitan areas enumerated in table XI, Part I. (Grand Junction is not a standard metropolitan area; hence only 36 are specified.) These selected areas include nearly 60 percent of the total metropolitan area population of the United States in 1940 and 1958. Over this period the total population in the 36 selected areas expanded at the same average rate as the entire U.S. metropolitan area population, namely, 2.2 percent per year. But for specific areas this rate varied from less than 1 percent for Boston and Sioux City to more than 6 percent for Albuquerque and Phoenix. In about 20 of the 36 cases examined a projection made by simple extrapolation of the 1940–58 growth rate led to results which appear reasonable and are not too far from those shown in table XI, Part I. Twenty-four million for the New York metropolitan area, nearly 8 million for Philadelphia, 12 million for Chicago, somewhat over 2 million for Kansas City for the year 2000 are some examples which are close to the previous Resources for the Future projection for the "middle" series. As was to be expected these "reasonable" results were obtained in those cases in which the growth rate of a specific metropolitan area did not differ too widely from the average for all standard metropolitan areas (to be specific, if it was under 3 percent). For those metropolitan areas which in recent decades expanded exceptionally fast this method led to implausible results, such as a population of 36 million for Los Angeles, 3 million for Albuquerque, over 7 million for Houston, by the year 2000.

The latter standard metropolitan areas are all in the southwestern part of the country. This region experienced in the 1940–58 period an explosive population growth which cannot be expected to continue at a similar pace. In order to test a different method this region, which comprises five water resources regions, was treated as a whole. The population of the nine selected standard metropolitan areas located in the southwest region was projected in the same way as the total metropolitan area population in the United States (tables J and K). That is, the population of each of the nine selected standard metropolitan areas was computed as a percentage of the total standard metropolitan area population in the southwest region for the years 1940 and 1958. The percentage share of each of the nine selected standard metropolitan areas in 1970 was assumed to equal the 1958 percentage plus (or minus) half the difference between the 1940 and the 1958 percentage; and the percentage share in 2000 was assumed to be equal to the 1970 percentage plus (or minus) the difference between the 1940 and 1958 percentage.

As shown in table M this method led to results which appear reasonable and are fairly close to the projections for the year 2000 in the "middle" series shown in table XI, part I. A similar experiment was made for a combined west-northwest region, comprising four water resource regions (upper Missouri, Great Basin, Pacific Northwest, and Central Pacific) and five selected metropolitan areas (Denver, Salt Lake City, Portland, Spokane, and San Francisco) with rather satisfactory results. This indicates that in attempting projections of the development of specific metropolitan areas—that is, of developments characterized by great diversity and instability—it might be more desirable to use a regional approach.

TABLE M.—*Population of selected standard metropolitan areas in southwest region*

[Projections for the year 2000 in thousands]

Water resource region and metropolitan area	Alternative regional projection	Original Resources for the Future projection "middle"
Upper Arkansas-Red:		
Oklahoma City	840	900
Amarillo	410	400
Western Gulf:		
Houston	3,400	3,800
Dallas	2,400	2,600
Fort Worth	2,200	2,400
San Antonio	1,200	1,400
Upper Rio Grande and Pecos: Albuquerque	1,000	900
Colorado: Phoenix	2,200	2,500
South Pacific: Los Angeles	16,000	15,000

O